

# Southland Region forecasting scenarios for **Beyond 2025 Southland**

June 2023



**Infometrics**

Economics put simply

## Authorship

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# Table of contents

<b>Table of contents .....</b>	<b>3</b>
<b>Executive summary.....</b>	<b>6</b>
Introduction .....	6
Scenarios .....	6
Regional employment falls in near term, then grows .....	6
Easing share of national employment.....	6
Invercargill leads employment growth .....	6
Agriculture leads employment decline .....	7
Employment growth strongest in highly-skilled occupations .....	7
Strongest growth in professional occupations .....	7
Southland GDP takes a sharper hit in from recession, smelter closure .....	7
Tiwai closure causes a short-term dip from baseline.....	7
Fewer technicians and trades workers if Tiwai closed.....	8
Modest employment boost of 140 jobs from SGH.....	8
SGH boosts high- and low-skilled occupations .....	8
Long-term boost of almost 3,000 jobs from aquaculture .....	8
Population projections reflect employment drivers .....	8
Drivers of population growth shift over time .....	8
Region’s population over 120,000 by 2054 in baseline.....	9
Invercargill population over 73,000 by 2054 in baseline .....	9
Over-65’s grow from 19% to 27% of region’s population .....	9
Fastest population growth in aquaculture scenario .....	9
Highest population if aquaculture expanded, lowest if Tiwai closed .....	10
Fastest household growth in Invercargill .....	10
Southland Region households reach over 50,110 .....	10
Slowest household growth if Tiwai closed, fastest if aquaculture expanded .....	10
<b>Introduction.....</b>	<b>11</b>
<b>Scenarios .....</b>	<b>12</b>
Baseline.....	12
Tiwai closure.....	13
Southern Green Hydrogen .....	13
Aquaculture .....	14
<b>Economy.....</b>	<b>15</b>
Baseline scenario.....	15
Regional employment grows to almost 65,000.....	15

Employment takes a slightly sharper hit than national average .....	15
Invercargill leads employment growth .....	16
Agriculture leads employment decline .....	17
Summary: Employment growth eases in Southland and Gore Districts .....	18
Employment growth strongest in highly-skilled occupations .....	18
Strongest growth in professional occupations .....	19
Southland GDP takes a sharper hit from recession .....	20
Increasing concentration of GDP in Invercargill .....	20
Summary: Regional GDP to reach \$11.3m.....	21
<b>Tiwai closure.....</b>	<b>21</b>
Tiwai closure causes a short-term dip from baseline.....	21
Smelter closure results in fewer jobs over long term.....	22
Smelter closure impact concentrated in manufacturing.....	22
Smelter closure has brief impact on GDP growth .....	23
Smelter closure causes a small, permanent hit to GDP .....	24
Fewer technicians and trades workers if Tiwai closed.....	24
<b>Southern Green Hydrogen .....</b>	<b>25</b>
Modest employment boost from SGH.....	25
SGH boosts GDP growth .....	26
SGH lifts GDP by \$762m .....	26
SGH boosts high- and low-skilled occupations .....	27
<b>Aquaculture .....</b>	<b>27</b>
Long-term boost of almost 3,000 jobs from aquaculture .....	27
Small GDP boost from aquaculture.....	28
<b>Summary of each scenario .....</b>	<b>28</b>
<b>Population.....</b>	<b>30</b>
<b>Our approach .....</b>	<b>30</b>
Consideration of each life stage and cohort.....	30
Employment forecasts drive net migration .....	30
Districtwide first, then sub-district.....	30
<b>Drivers of population change .....</b>	<b>30</b>
International net migration to recover slowly .....	30
Distribution of regional net migration shifts .....	31
Shifts in migration benefit Southland.....	32
Drivers of population growth shift over time.....	32
<b>Baseline scenario.....</b>	<b>33</b>
Region’s population over 120,000 by 2054.....	33
Southland’s population growth to lag New Zealand .....	33
Strongest population growth in Invercargill .....	34
Invercargill population over 73,000 by 2054 .....	34

Average age rises everywhere .....	35
Over-65's grow from 19% to 27% of region's population .....	36
Gore population remains region's oldest .....	36
Largest increase in over-65 share in Southland .....	37
All age groups grow in Invercargill.....	38
Sub-district population growth.....	38
Gore District growth concentrated in Gore township.....	38
Stronger growth in Fiordland .....	39
Bluff to grow, but lag Invercargill.....	40
<b>Population scenarios.....</b>	<b>40</b>
Fastest population growth in aquaculture scenario .....	40
Lowest population if Tiwai closed.....	41
<b>Households.....</b>	<b>43</b>
Our approach to projecting households.....	43
Fastest household growth in Invercargill .....	43
Southland Region households reach over 50,110.....	43
Average household size falls everywhere .....	44
<b>Household scenarios.....</b>	<b>45</b>
Slowest household growth if Tiwai closed, fastest if aquaculture expanded .....	45
Strongest household growth in the coming decade.....	46
<b>Appendix 1 – our approach in detail .....</b>	<b>47</b>
<b>Employment forecast .....</b>	<b>47</b>
Macro-economic model.....	47
General equilibrium model .....	47
Regional Forecasting Model .....	48
<b>Population projection.....</b>	<b>49</b>
Population base.....	49
Fertility .....	50
Mortality .....	50
Migration .....	50
International net migration volumes .....	50
Regional distribution of migration .....	50
Labour Market Shortfalls .....	51
<b>Household projection .....</b>	<b>51</b>

# Executive summary

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## Introduction

Beyond 2025 Southland commissioned Infometrics to produce this report, as part of a wider package of forecasting and reporting on the Southland Region, territorial authorities and sub-district areas. This report provides a set of scenarios for the region, building on a series of historical baseline reports.

## Scenarios

The four scenarios capture a range of possible and aspirational outcomes for the Southland Region. The baseline scenario forms a foundation from which the rest of the scenarios are built upon. Notably, the baseline scenario assumes the continued operation of the Tiwai Point aluminium smelter throughout the projection period, and that a degree of agricultural land use change takes place as carbon prices rise.

The additional scenarios encompass closure of the Tiwai Point aluminum smelter, the Southern Green Hydrogen (SGH) project going ahead, and an accelerated expansion of on-shore and off-shore (open ocean) aquaculture in Southland Region. The aquaculture scenario is based on an aquaculture sector goal to reach \$1b revenue by 2035 and \$2.6b by 2054.

## Regional employment falls in near term, then grows

Under the baseline scenario, employment in Southland Region is expected to ease slightly between 2022 and 2023, driven by recessionary conditions. Employment growth is expected to pick up again from 2024 onwards. Employment is projected to rise to 60,049 by 2034, and total 64,259 by 2054.

## Easing share of national employment

As Southland's employment growth is expected to lag New Zealand, Southland Region's share of total employment in the country is projected to decline. Southland Region accounts for 2.1% of New Zealand employment as of 2022, with this share forecast to fall to 2.0% in 2034, and reach 1.9% in 2054.

## Invercargill leads employment growth

Employment in Invercargill City is expected to weather recessionary conditions fairly well, with the number of filled jobs falling 0.2%pa in 2024 compared to projected declines of 0.5%pa in Southland District and 1.2%pa Gore District. However, Southland District is expected to return to positive growth most quickly, picking up to 0.8%pa in 2025 compared to further projected declines of 0.1%pa in Invercargill City and 0.4%pa in Gore District. Invercargill City's employment growth is expected to outpace the rest of the region from 2026 onwards.

## Agriculture leads employment decline

Infometrics forecasts indicate that the agriculture, forestry, and fishing industry, which has historically made large contributions to employment growth in Southland Region, is expected to decline in the long term.

The agriculture, forestry, and fishing industry created an average of 73 jobs per year in the region between 2010 and 2020. We expect this industry to see a decline of 48 jobs per year on average between 2022 and 2034, with losses then accelerating to 69 jobs per year till the end of the forecast period. This reflects increasing headwinds for the sector, notably a rising carbon price, possible inclusion of agriculture in the emissions trading scheme, and implementation of the national policy statement for freshwater management. This has a flow-on effect to related industries such as meat and dairy manufacturing, which contributes to an overall decline in manufacturing employment at the regional level.

## Employment growth strongest in highly-skilled occupations

In the baseline scenario, we expect employment growth in the next twelve years to be weaker than over 2010-20 for low-skilled (e.g. labourers, drivers) and highly-skilled labour (e.g. professionals, managers), but stronger for skilled labour (e.g. tradespersons). In all skill levels, growth is expected to moderate significantly over 2034-2054, but highly-skilled employment will remain relatively stronger. This reflects historical trends around specialisation in the economy and the adoption of automation technology which can displace some low-skilled jobs.

## Strongest growth in professional occupations

Stronger expectations for highly-skilled jobs growth comes off the back of high projections for net growth in professional occupations. Professional occupations saw rapid growth of 139 jobs per year on average between 2010 and 2020. We expect this growth to sit at 154 per year between 2022 and 2034, and ease to 86 per year from 2034 to 2054. We expect softer growth for skilled and semi-skilled jobs due to more moderate projections for the community and service, and technician and trades occupations.

## Southland GDP takes a sharper hit in from recession, smelter closure

Southland Region's GDP is forecast to take a sharper hit than New Zealand overall due to near-term recessionary conditions. Infometrics forecasts point to a 1.0%pa fall in Southland's GDP in 2024, a more severe decline than the 0.3%pa fall expected for New Zealand overall. GDP growth will turn positive in the region by 2027, reaching a peak of 2.5%pa in 2028 and stabilizing around 1.5%pa thereafter, while New Zealand GDP growth remains around 1.8%pa. We expect Southland Region economic growth will ease to 1.1%pa in 2051, and nationwide economic growth to slow to 1.2%pa.

## Tiwai closure causes a short-term dip from baseline

The closure of Tiwai Point aluminium smelter from August 2024 will cause notably slower employment growth compared with the baseline scenario for a three-year period, with growth rates following the same track from 2027 onwards. A short period of slower employment growth than in the baseline scenario will result in a slightly lower number

of jobs in Southland Region. We expect the employment level to reach 59,116 in 2034 (933 fewer than the baseline scenario), and 63,308 in 2054 (950 fewer). The employment impact would be almost entirely in Invercargill City.

## Fewer technicians and trades workers if Tiwai closed

In the Tiwai closure scenario, employment across almost all occupations except for community and service workers, and sales workers, is affected. In particular, growth in the number of technicians in Southland Region is projected to average 32 per year between 2022 and 2034, 21 jobs per year fewer than under the baseline scenario. These expectations are based on the assumed composition of aluminium smelting sub-industry at a national level, not the specific composition of the Tiwai workforce.

## Modest employment boost of 140 jobs from SGH

The development of a hydrogen and ammonia facility in Invercargill City is expected to have a modest impact on employment growth in the Southland Region overall, scaling up to 140 jobs in Invercargill between 2026 and 2035, and holding at that level thereafter.

## SGH boosts high- and low-skilled occupations

Based on assumed occupation composition of the petroleum refining industry (an analogue for hydrogen generation) we expect the additional manufacturing jobs created by SGH will be concentrated in manager, professional, clerical and admin, and labouring occupations. This will translate to a higher number of highly-skilled (professional and managerial) workers compared to the baseline, and a higher number of low-skilled (clerical, admin, and labour) workers.

## Long-term boost of almost 3,000 jobs from aquaculture

The expansion of on-shore and open-ocean aquaculture in Southland Region is projected to have a strong impact on employment, scaling up to 2,944 added jobs in Invercargill City over the forecast period. In 2034, employment in the aquaculture scenario will total 61,064, which is 1,015 more jobs than in the baseline scenario. By 2054, employment in the aquaculture scenario is projected to total 67,203, almost 3,000 more jobs than in the baseline scenario.

## Population projections reflect employment drivers

Our population projections follow a cohort-component approach, reflecting the probabilities of different life events for each age and sex group. Our key point of difference is in considering labour force shortfalls for driving net migration into the region. This means that our population projections reflect the different levels of employment forecast across the four scenarios.

## Drivers of population growth shift over time

Natural increase is expected to become negative in Southland Region in the 2040s, and nationally in the 2050s. From this point onwards, deaths will outnumber births, and the population will decline unless there is significant net migration gain. A modest level of



net migration is expected to come into the region to fill labour force shortfalls, increasing over time to fill the gap left by negative natural increase.

## Region's population over 120,000 by 2054 in baseline

Southland Region's population is estimated to be 102,400 as at 2022, up from 95,800 in 2012. The population is expected to reach 110,492 by 2034 and grow at a diminishing rate to 120,929 at 2054. We expect that in Invercargill City, the region's major urban hub, population growth will remain positive throughout the forecast period, while population growth in Southland District and Gore District will turn negative in the 2040s. This differential reflects a differential in the employment forecasts, with a stronger outlook for jobs in Invercargill than the rest of the region.

## Invercargill population over 73,000 by 2054 in baseline

The population of Invercargill City is expected to rise from an estimated 56,800 in 2022, to 62,359 in 2034, and reach 73,006 at the end of the projection period. The population of Southland District, estimated to be 32,592 in 2022, will increase slowly to a peak of 35,086 in 2043, and begin declining thereafter to 34,725 in 2054. In Gore District, which is expected to see the weakest population growth of Southland Region's three territorial authorities, the population is expected to reach a peak of 13,460 in 2041 and ease to 13,198 by the end of the forecast period. The differential between Southland District and Gore District reflects Gore's slightly softer employment outlook.

## Over-65's grow from 19% to 27% of region's population

The increase in average age in Southland Region comes as a result of a rising proportion of people aged 65 and over. We expect the number of people aged 65 and older to increase from 19,471 (19% of total) in 2023, to 32,690 (27%) in 2054.

Gore District has the largest proportion of over 65s of Southland Region's three territorial authorities. We expect this to remain true over the forecast period, causing the working-age share of the population to decline from 60% in 2023, to 57% in 2054. Southland District is expected to see the largest percentage point increase in the share of over 65s across the three territorial authorities. The number of over 65s in Southland District is expected to increase by from 5,790 to 9,575 between 2023 and 2054, lifting their share of the total population from 18% to 28%. The most rapid growth in Invercargill City will be in the number of over-65s, which is expected to grow from 10,790 in 2023 to 19,422 in 2054, lifting their share of the population from 19% to 27%.

## Fastest population growth in aquaculture scenario

Compared to the baseline scenario, the expansion of on-shore and open-ocean aquaculture in Southland Region would lead to broadly faster population growth until the mid-2040's, with the rate of population growth then beginning to converge. We expect population growth across the region in the aquaculture scenario to peak at 1.0%pa in 2032, 0.3 percentage points ahead of the forecast baseline scenario growth rate that year.

The Tiwai closure scenario leads to accelerated job losses in manufacturing, and this in turn leads to slower population growth compared with the baseline scenario. Population growth in the Tiwai closure scenario is expected to remain around 0.1 percentage points below baseline population growth until the late 2030's, before beginning to converge.

The SGH scenario has a relatively small employment effect, which makes population growth very similar to that of the baseline scenario.

## Highest population with aquaculture, lowest if Tiwai closed

These differences in population growth will mean that the population of Southland Region will be significantly higher than baseline if aquaculture is expanded, and slightly lower in the Tiwai closure scenario. By 2034, the projected population in the aquaculture and Tiwai closure scenarios are 112,634 and 109,551 respectively. These population projections compare to 111,194 in the baseline scenario in 2034.

By 2054, the population of Southland Region in the aquaculture scenario is expected to total 126,241, which is 5,313 more people than in the baseline scenario. The region's population in the Tiwai closure scenario is expected to total 119,682, which is 1,246 fewer people than in the baseline scenario.

## Fastest household growth in Invercargill

Household growth is expected to reach a peak of 1.1%pa in 2032 in Invercargill City, and remain positive over the forecast period. We expect household growth in Invercargill City to slow down over time, easing to 0.7%pa in 2040 and remaining in the 0.6-0.7%pa range until the end of the forecast period.

Gore District's household growth is expected to spike to 1.7%pa in 2023, reflecting a resumption in population growth as international borders reopen. Household growth is expected to taper off rapidly, reaching a second, much lower peak of 0.3%pa in 2029 and easing thereafter. We expect the number of households in Gore District to begin declining slowly in the late 2040's.

A similar spike in household growth is expected in Southland District, at 1.2% in 2023. We expect household growth to soften to 0.8%pa by 2024 and turn negative in the late 2040s.

## Southland Region households reach over 50,110

The total number of households in Southland Region in 2022 is estimated to be 41,689, 56% of which are in Invercargill City, and 31% in Southland District. We expect the number of households in Invercargill City to climb from 23,256 in 2022, to 26,087 in 2034, and reach 30,034 in 2054. This growth will bring Invercargill's share of the region's households to 60%. In total, the number of households in the region will reach just over 50,110.

## Slowest household growth if Tiwai closed, fastest if aquaculture expanded

Annual household growth is projected to exceed the baseline scenario from the mid 2020's to the late 2040's, peaking at 557 new households in 2032. For comparison, in the baseline scenario, we expect 391 new households in Southland Region in 2032. In the Tiwai closure scenario, annual household growth peaks at 348 new households in 2031, 41 fewer than in the baseline scenario. In 2054, we expect just shy of 150 new households in all scenarios except aquaculture, which would add 168 new households to the region.

# Introduction

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Beyond 2025 Southland commissioned Infometrics to produce this report, as part of a wider package of forecasting and reporting on the Southland Region, territorial authorities and sub-district areas. This report provides a set of scenarios for the region, building on a series of historical baseline reports. The scenarios within this report encompass a baseline where the Tiwai Point aluminum smelter continues to operate, closure of the Tiwai Point aluminum smelter, operation of the Southern Green Hydrogen project, and expansion of aquaculture. For each scenario, we have developed forecasts of employment, GDP, population and households; including detailed outputs by industry, occupation, age structure and household type.

This report begins by detailing the four scenarios, then exploring the economic, population, and household projections for each. This is supplemented with an executive summary and a detailed methodology.

# Scenarios

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The four scenarios capture a range of possible and aspirational outcomes for the Southland Region. The baseline scenario forms a foundation from which the rest of the scenarios are built upon. Notably, the baseline scenario assumes that the Tiwai Point aluminum smelter continues to operate throughout the projection period, and that a degree of agricultural land use changes take place as carbon prices rise.

The additional scenarios encompass the closure of the Tiwai Point aluminum smelter in 2024, the Southern Green Hydrogen project going ahead, and expansion of the region's aquaculture sector. The Southern Green Hydrogen and aquaculture scenarios both build on the baseline scenario, assuming that the Tiwai Point aluminum smelter continues to operate.

We considered modelling additional scenarios around the recovery of the tourism sector and removal of the Zero Fees offering at Southland Institute of Technology. We decided not to include tourism as there was a wide range of potential outcomes to model. We did not model the removal of Zero Fees as understanding the impact of this on the region-wide economy was particularly complicated and nuanced, and subject to considerable uncertainty in how Te Pukenga chooses to operate. Furthermore, work by BERL on Zero Fees highlighted that the programme impact was concentrated in several specific demographics, such as older students with disjointed learning histories, so it may not have an appreciable economy-wide impact.

The approach and assumptions for each scenario are detailed below, with the economic and population outcomes detailed in following sections.

## Baseline

The baseline scenario reflects a continuation of current economic and policy settings. This includes the continued operation of the Tiwai Point aluminium smelter throughout the projection period.

We have assumed that the smelter would keep operating at the same level of output as it currently does, however, it is worth acknowledging that the operating model could change in future, for example, adjusting production levels dynamically in response to the national electricity market to help with 'dry years' when production of electricity is constrained.

The baseline scenario assumes current policy settings for land use and carbon emissions, include progression to a carbon emission price on the New Zealand Emissions Trading Scheme (ETS) of \$200 per tonne of carbon dioxide equivalents by 2050. This encourages a degree of agricultural land use change, with an 83% increase in forestry and logging employment between 2023 and 2054 reflecting a steady trend of converting pastoral lands to forestry.

## Tiwai closure

The Tiwai closure scenario assumes that the smelter closes at the currently stated closure date of August 2024. We have not included the potential impact of the Tiwai Point site being decommissioned due to a lack of clarity on the extent and duration of decommissioning, but note the potential for a strongly positive economic impact for several years.

Our modelling of the Tiwai Point smelter is based on our previous work for Great South on the impact of the smelter closure in 2017 and 2020. This includes application of multiplier analysis to estimate the effect of smelter closure on suppliers. This has then been adjusted to reflect that some suppliers are either located out of the region or would not vary their output in response to the smelter closure. For example, electricity generated at Manapouri is a significant input for the smelter, but it is reasonable to expect this would be used elsewhere in the region or New Zealand after the smelter closes, particularly given decarbonisation efforts led by Great South. Effects have been apportioned across the region using the place of residence of smelter workers as a proxy for the location of suppliers. This places 97% of indirect and induced effects on Invercargill City, 3% on Southland District and 0% on Gore District.

## Southern Green Hydrogen

This scenario reflects the full scale Southern Green Hydrogen (SGH) project going ahead. This involves development of a green hydrogen facility in Invercargill City to convert electricity to green hydrogen and/or ammonia for export. As the SGH project is at a conceptual stage, we have worked with a limited range of information and made a number of assumptions around how the project will proceed and operate. We have used an economic impact assessment contained within the McKinsey & Company report<sup>1</sup> to indicate the nature and scale of operations. This study suggested a total GDP impact of \$500-600m as a result of SGH operations.

We have used the petroleum refining industry as an analogue to understand how the economic impact of SGH may accrue to Invercargill, as both industries have similar characteristics – being capital and energy intensive, and involving highly-skilled employees.

New Zealand's petroleum refining industry predominantly consisted of the Marsden Point Oil Refinery in Whangarei District, which closed in 2022. The Marsden Point Oil Refinery not only had staff in Whangarei, but also in Auckland and Wellington. Staff outside of Whangarei perform 'head office' type tasks and accordingly Auckland and Wellington capture some of the GDP associated with the Marsden Point refinery. We can expect a similar distribution of GDP with the SGH project, meaning that the facility's GDP impact won't solely accrue to Invercargill. In 2021, 54% of New Zealand's petroleum manufacturing employment was located in Whangarei, and 39% of GDP. Applying this split to the midpoint of the McKinsey GDP impact estimates suggests a \$213m annual boost to Invercargill City's GDP from SGH. Assuming that SGH has the same level of GDP per employee as the Marsden Point refinery, this suggests an ongoing employment impact of 140 jobs. We have apportioned these impacts solely to the manufacturing industry in Invercargill, given the limited detail around exactly where and how the facility

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<sup>1</sup> *The New Zealand hydrogen opportunity*. McKinsey & Company, May 2021.

will operate. We note that SGH may locate their head office in Invercargill which would substantially increase the GDP impact on the city.

## Aquaculture

The aquaculture scenario is based on Great South modelling of an aquaculture industry goal to achieve \$1b in revenue by 2035, with further growth to \$2.6b revenue by 2054. This assumes significant private and government investment to expand on-shore and off-shore (open ocean) aquaculture in Southland Region, with on-shore processing and smolt production. Great South modelling indicates that this will translate to a 2,900 increase in employment between 2023 and 2054. We have modelled the GDP impact of this increase based on an economic impact assessment<sup>2</sup> of Ngai Tahu Seafood's Hananui proposal for an aquaculture farm off the coast of Stewart Island. This effectively assumes that the operations proposed for the Hananui project are representative of the expansion of the sector as a whole.

The existing aquaculture industry in Southland is captured in economic statistics in a disjointed manner, which has made it challenging to understand the economic impact of the existing industry in order to understand the potential impact under an expansion scenario. The aquaculture scenario should be treated as indicative.

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<sup>2</sup> *Hananui Aquaculture Facility Economic Assessment*. M.E Consulting, October 2022.

[https://www.epa.govt.nz/assets/Uploads/Documents/Fast-track-consenting/Hananui/the-application/Appendix-AA\\_Economic-report.pdf](https://www.epa.govt.nz/assets/Uploads/Documents/Fast-track-consenting/Hananui/the-application/Appendix-AA_Economic-report.pdf)

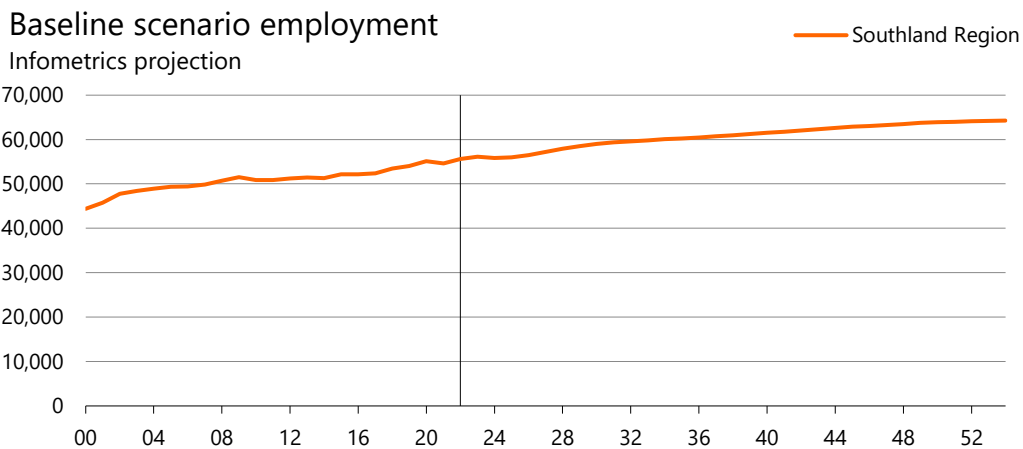
# Economy

## Baseline scenario

### Regional employment grows to almost 65,000

Employment in Southland Region rose from 44,410 filled jobs in the year to March 2000, to 55,611 in the year to March 2022 (Graph 1). Under the baseline scenario, employment in Southland Region is expected to ease slightly between 2022 and 2023, driven by recessionary conditions. Employment growth is expected to pick up again from 2024 onwards. Employment is projected to rise to 60,049 by 2034, and total 64,259 by 2054.

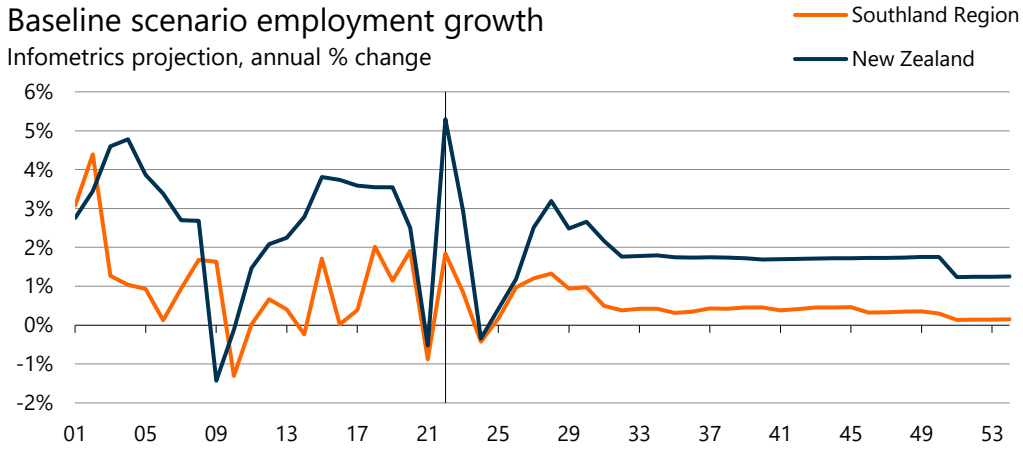
Graph 1



### Employment takes a slightly sharper hit than national average

National employment is forecast to fall 0.3%pa in the year to March 2024 as the country dips into a brief recession (Graph 2). A slightly sharper hit is expected for Southland Region. Southland Region employment is forecast to fall 0.4%pa in 2024, picking up to 0.2%pa in 2025, and 1.0%pa in 2026. Thereafter, employment growth is forecast to peak in 2028, reaching 1.3%pa in Southland Region, and 3.2%pa in New Zealand. Employment growth in Southland Region will then stabilise in the 0.3-0.5%pa range, with New Zealand's employment growth sitting around 1.5 percentage points higher. By 2051, employment growth in Southland Region will taper off to 0.1%pa.

Graph 2



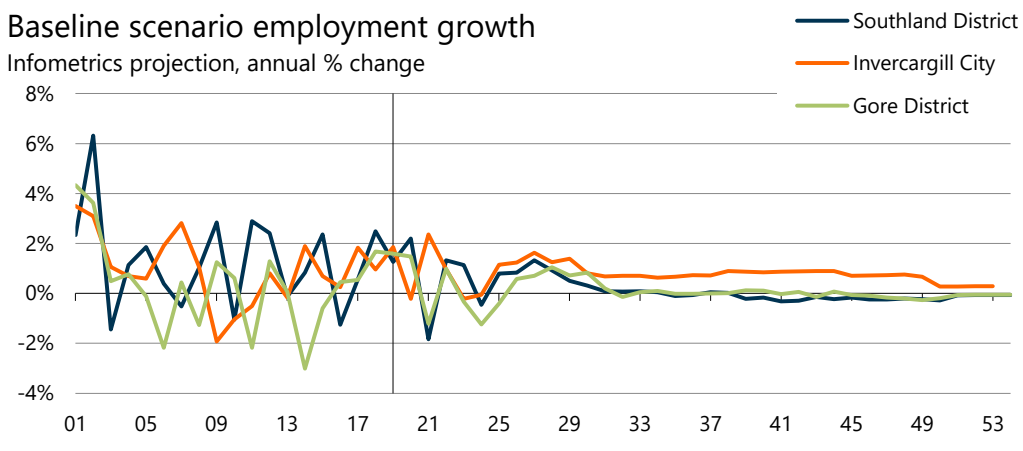
As Southland’s employment growth is expected to lag New Zealand, Southland Region’s share of total employment in the country is projected to decline. Southland Region accounts for 2.1% of New Zealand employment as of 2022, with this share forecast to fall to 2.0% in 2034, and reach 1.9% in 2054.

### Invercargill leads employment growth

Employment in Invercargill City is expected to weather recessionary conditions fairly well, with the number of filled jobs falling 0.2%pa in 2024 compared to projected declines of 0.5%pa in Southland District and 1.2%pa Gore District (Graph 3). However, Southland District is expected to return to positive growth most quickly, picking up to 0.8%pa in 2025 compared to further projected declines of 0.1%pa in Invercargill City and 0.4%pa in Gore District. By 2026, employment growth across all three districts will have become positive.

Invercargill City’s employment growth is expected to outpace the rest of the region from 2026 onwards. Growth will remain positive in Invercargill City, stabilizing in the 0.7-0.9%pa range and then easing to 0.3%pa in 2051. Employment growth is forecast to remain fairly flat in Gore District, and very weakly negative in Southland District, from the 2030’s until the end of the forecast period.

Graph 3





## Agriculture leads employment decline

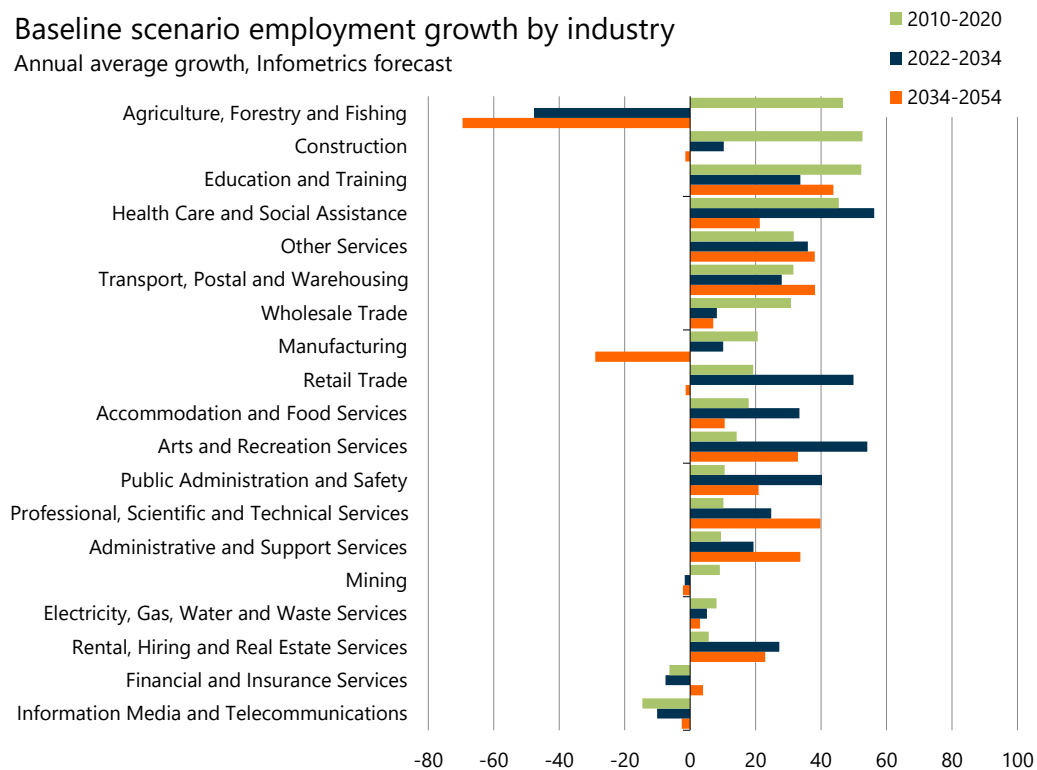
Infometrics forecasts indicate that the agriculture, forestry, and fishing industry, which has historically made large contributions to employment growth in Southland Region, is expected to decline in the long term (Graph 4).

The agriculture, forestry, and fishing industry created an average of 73 jobs per year in the region between 2010 and 2020. We expect this industry to see a decline of 48 jobs per year on average between 2022 and 2034, with losses then accelerating to 69 jobs per year till the end of the forecast period. This reflects increasing headwinds for the sector, notably a rising carbon price, possible inclusion of agriculture in the emissions trading scheme, and implementation of the national policy statement for freshwater management. This has a flow-on effect to related industries such as meat and dairy manufacturing, contributing to an overall decline in manufacturing employment at the regional level. Retail trade is expected to decline by 1 job per year between 2034 and 2054, reflecting historical trends and the switch towards online retail for some goods. Construction employment rose to a record high for the region over 2010-2020, and is forecast to expand further over the 2022 to 2034 period. Over the long term, construction employment is forecast to notch back, partially unwinding growth of the 2022 to 2034 period, reflecting that softer economic and population growth in future will reduce demand for new construction.

Graph 4

### Baseline scenario employment growth by industry

Annual average growth, Infometrics forecast



## Summary: Employment growth eases in Southland and Gore Districts

Employment growth has been strongest in Southland District in recent years, averaging for 1.1%pa average over 2010-2020 (Table 1). However, employment growth is forecast to be strongest in Invercargill City at 1.0% pa over 2022-2034 and 0.7% over 2034-2054. We expect Invercargill City will recover well from short-term impacts of the national recession and lift its share of the region's total employment from 55% in 2022 to 60% in 2054. Employment growth in Southland and Gore Districts is projected to be softer over the 2022-2034 period and decline over the 2034-2054 period, reflecting a softer outlook for the primary sector.

**Table 1**

### Employment level and growth by area under baseline scenario

Infometrics forecast

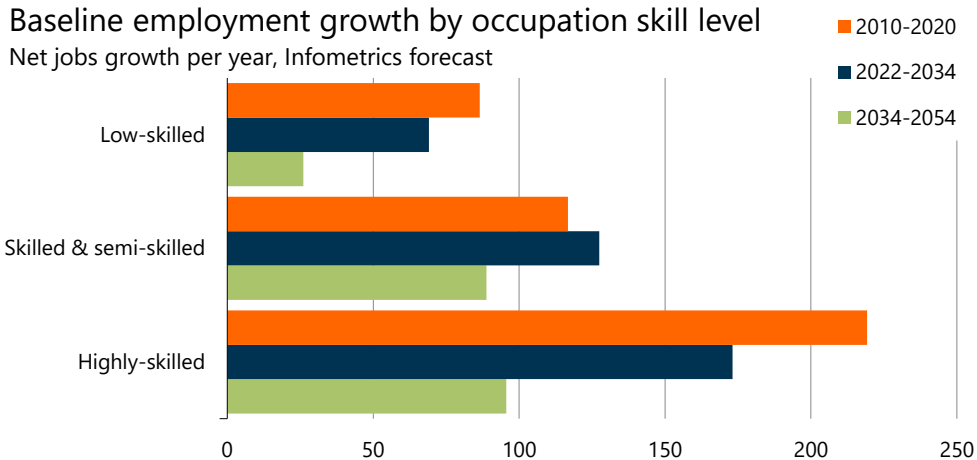
Area	Employment level				Employment growth (annual average)		
	2010	2022	2034	2054	2010-2020	2022-2034	2034-2054
Gore District	7,165	7,231	7,381	7,304	0.1%	0.2%	-0.1%
Southland District	15,730	17,898	18,926	18,340	1.1%	0.6%	-0.2%
Invercargill City	27,969	30,482	33,742	38,615	0.7%	1.0%	0.7%
Southland Region	50,864	55,611	60,049	64,259	0.7%	0.8%	0.3%

## Employment growth strongest in highly-skilled occupations

We have estimated employment growth by occupation based on our forecasts for employment by industry, and forecasts of the mix of occupations in each industry.

In the baseline scenario, we expect employment growth in the next twelve years to be weaker than over 2010-20 for low-skilled (e.g. labourers, drivers) and highly-skilled labour (e.g. professionals, managers), but stronger for skilled labour (e.g. tradespersons) (Graph 5). In all skill levels, growth is expected to moderate significantly over 2034-2054, but highly-skilled employment will remain relatively stronger. This reflects historical trends around specialisation in the economy and the adoption of automation technology which can displace some low-skilled jobs. We expect that annual average net growth for low-skilled labour to ease from 69 jobs per year to 26 between the 2022-34 and 2034-54 periods. Skilled labour growth is forecast to ease from 128 to 89 jobs per year, and highly-skilled from 173 to 96 per year. Highly-skilled labour will remain the fastest growing skill level over the forecast period.

Graph 5



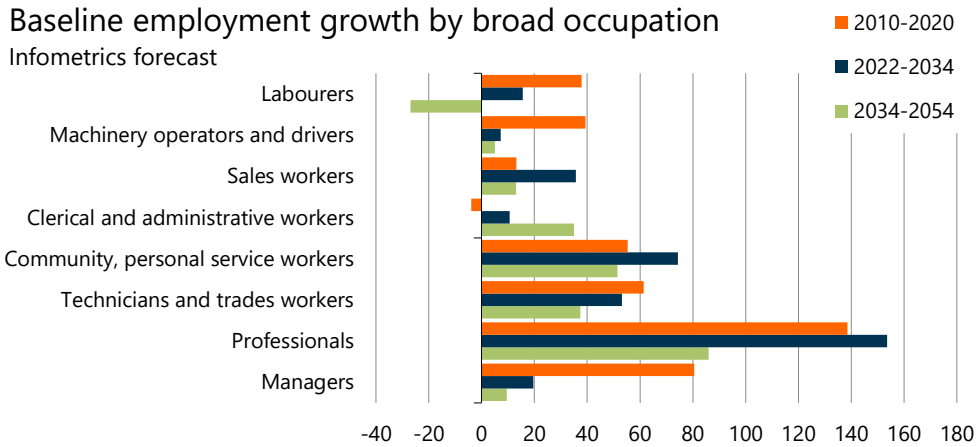
## Strongest growth in professional occupations

Stronger expectations for highly-skilled jobs growth comes off the back of high projections for net growth in professional occupations. Professional occupations saw rapid growth of 139 jobs per year on average between 2010 and 2020 (Graph 6). We expect this growth to sit at 154 per year between 2022 and 2034, and ease to 86 per year from 2034 to 2054. Managerial occupations will be a much smaller contributor to highly-skilled jobs growth, easing to an average of 20 new manager jobs per year over 2022-34, and 10 per year over 2034-54, after growing at 81 per year over 2010-20. This reflects that the occupation of farmer is classified within the manager grouping, and will be affected by the softer outlook for agriculture.

We expect softer growth for skilled and semi-skilled jobs due to more moderate projections for the community and service, and technician and trades occupations. The level of technicians and trade occupations is expected to remain elevated, coming off a period of significant construction activity. We expect growth in the number of community and personal service workers to lift from 55 per year over 2010-20 to 74 per year over 2022-34, but slow to an average of 51 per year thereafter. Growth in the number of technicians and trades workers is expected slow to 53 per year over 2022-34, and ease to 37 per year in the longer-term.

Growth in the number of low-skilled jobs, including clerical, sales, machinery operation, and labouring work, is expected to be fairly slow for both our medium- and long-term projections. We expect growth in sales work to be faster over the forecast period than over 2010-20, and for the number of labourers to decline between 2034 and 2054.

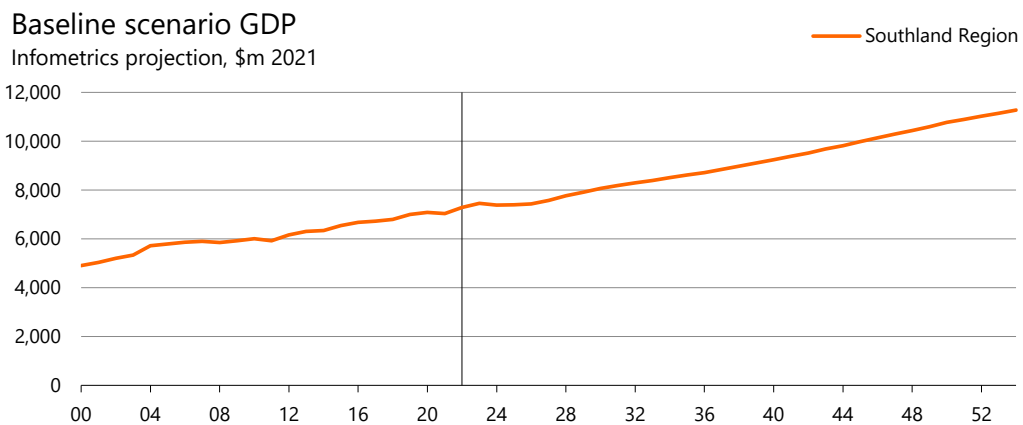
Graph 6



### Southland GDP takes a sharper hit from recession

Southland Region’s GDP is forecast to take a sharper hit than New Zealand overall due to near-term recessionary conditions. Infometrics forecasts point to a 1.0%pa fall in Southland’s GDP in 2024, a more severe decline than the 0.3%pa fall expected for New Zealand overall. GDP growth will turn positive in the region by 2027, reaching a peak of 2.5%pa in 2028 and stabilizing around 1.5%pa thereafter, while New Zealand GDP growth remains around 1.8%pa. We expect Southland Region economic growth will ease to 1.1%pa in 2051, and nationwide economic growth to slow to 1.2%pa. This growth will take the region’s annual GDP from \$7,228m in 2022, to \$8,502m in 2034, and \$11,268m at the end of the forecast period, in real terms (2021 constant prices)(Graph 7). Between 2022 and 2054, Southland Region’s share of nationwide GDP is expected to ease slightly from 2.0% to 1.8%.

Graph 7

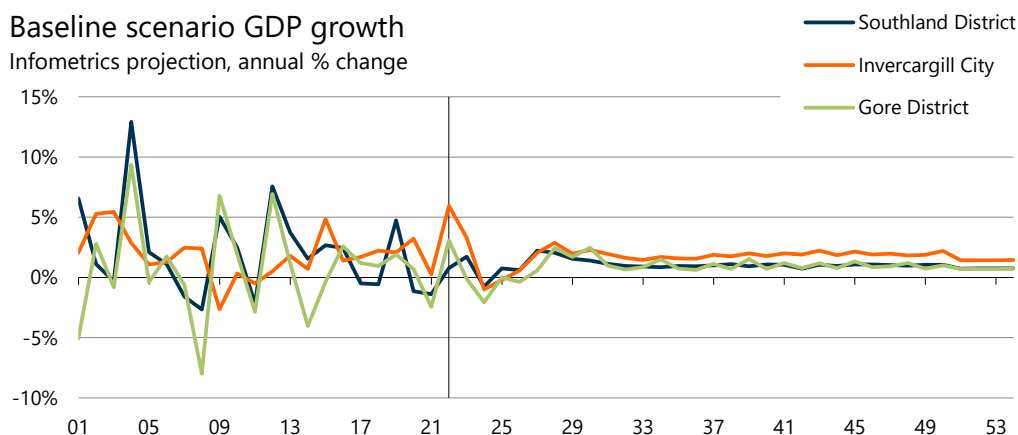


### Increasing concentration of GDP in Invercargill

GDP is expected to decline on an annual basis over 2024 and 2025 in Invercargill City but turn positive in 2025 in Southland District (Graph 8). GDP growth is projected to turn positive in Gore District in 2027. By 2028, Invercargill City will become the region’s fastest growing economy and reach its peak growth rate (for the forecast period) of

2.9%pa, while Gore District and Southland District lag slightly at 2.5%pa and 2.0%pa respectively. By 2051, Invercargill City's economic growth will stabilize at 1.5%pa, as Gore District and Southland District both grow at 0.7%pa. The differential between the City and broader region reflects greater diversity in the City and significant headwinds for agricultural production over the forecast period.

Graph 8



## Summary: Regional GDP to reach \$11.3m

In the baseline scenario, we expect that GDP in Southland Region will be increasingly concentrated in Invercargill City. Invercargill's share of Southland Region GDP in 2022 is estimated to be 51%, and we expect this to lift to 57% by 2054. Regional GDP levels and growth are summarized in Table 2.

Table 2

### GDP level and growth by area under baseline scenario

Infometrics forecast (\$m, 2021 constant prices)

Area	GDP level				GDP growth (annual average)		
	2010	2022	2034	2054	2010-2020	2022-2034	2034-2054
Gore District	802	872	950	1,140	0.7%	0.9%	0.9%
Southland District	2,279	2,709	3,096	3,745	1.5%	1.3%	1.0%
Invercargill City	2,922	3,707	4,456	6,384	2.0%	1.9%	1.8%
Southland Region	6,003	7,288	8,502	11,268	1.6%	1.6%	1.4%

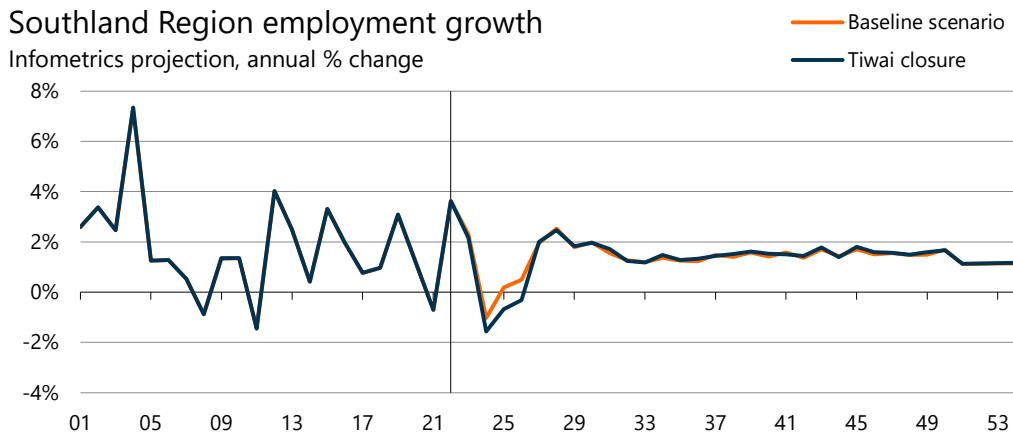
## Tiwai closure

### Tiwai closure causes a short-term dip from baseline

The closure of Tiwai Point aluminium smelter from August 2024 will cause notably slower employment growth compared with the baseline scenario for a three-year period, with growth rates following the same track from 2027 onwards. This reflects that our employment estimates are annual averages, so the assumed closure in August 2024 is only partially reflected in the year to March 2025.

In the Tiwai closure scenario, employment growth will turn negative (-1.6%pa) in 2024 (see Graph 9), a sharper hit than the national average as both the recession and the smelter closure affect the region. However, employment growth is expected to turn positive in 2027 and return to a similar rate as in the baseline scenario. This reflects the diversity of the region’s economy and the fact that most industries do not directly rely on the smelter.

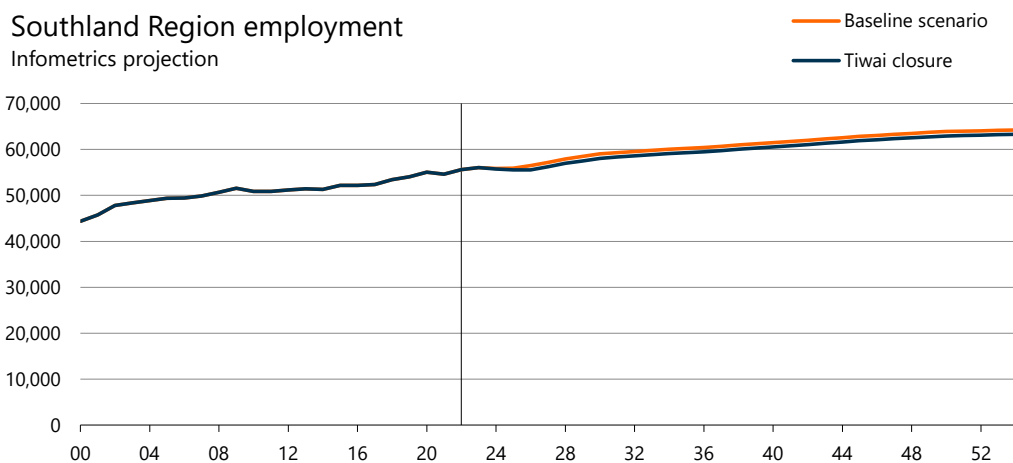
Graph 9



### Smelter closure results in fewer jobs over long term

A short period of slower employment growth than in the baseline scenario will result in a slightly lower number of jobs in Southland Region (Graph 10). We expect the employment level to reach 59,116 in 2034 (933 fewer than the baseline scenario), and 63,308 in 2054 (950 fewer). The employment impact would be almost entirely in Invercargill City.

Graph 10



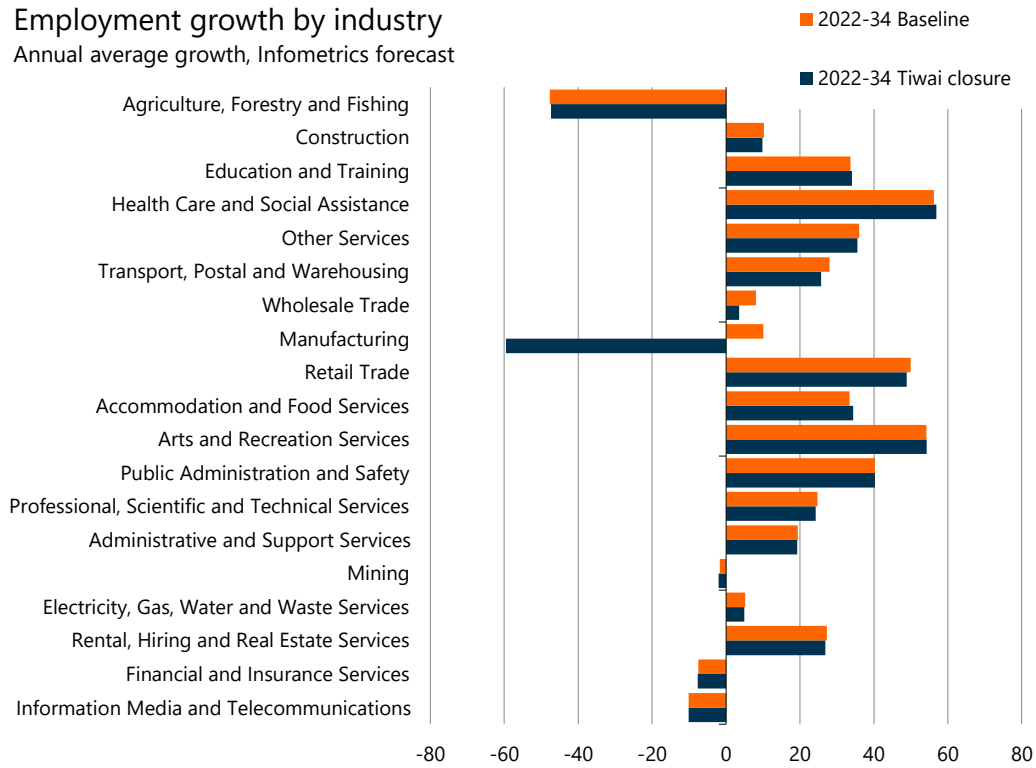
### Smelter closure impact concentrated in manufacturing

The closure of Tiwai Point aluminium smelter affects our employment growth expectations for only the medium-term (2022-34). In this scenario, we forecast the loss

of 60 manufacturing jobs per year on average between 2022 and 2034, compared to the creation of 10 per year in the baseline scenario (Graph 11). We also expect slightly slower employment growth in the wholesale trade industry, with four jobs per year created if the smelter is closed, compared to eight per year under the baseline.

Graph 11

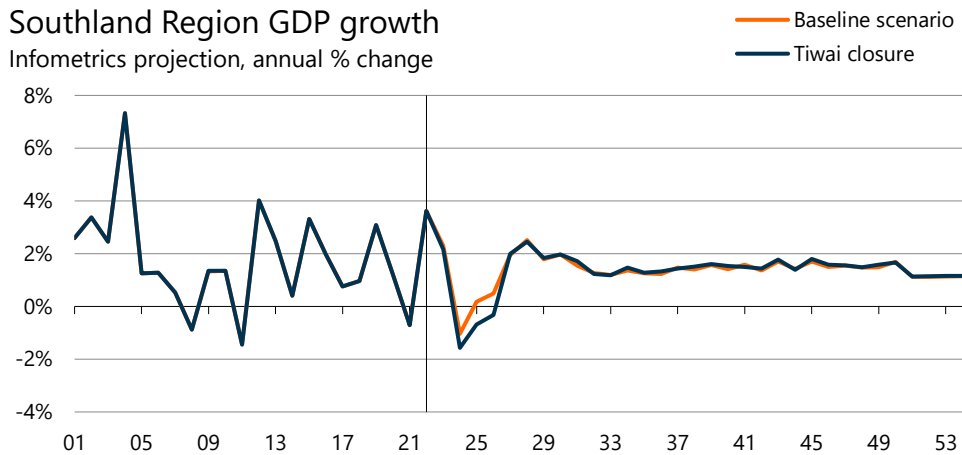
**Employment growth by industry**  
Annual average growth, Infometrics forecast



**Smelter closure has brief impact on GDP growth**

Similar to employment, the closure of the smelter will have a brief impact on GDP growth. In 2024, GDP is expected to decline 1.6%pa, compared to 1.0%pa in the baseline scenario (Graph 12). GDP growth is projected to turn positive from 2027 onwards, with growth in the baseline scenario turning positive earlier in 2024. From 2027, GDP growth will mirror that of the baseline scenario.

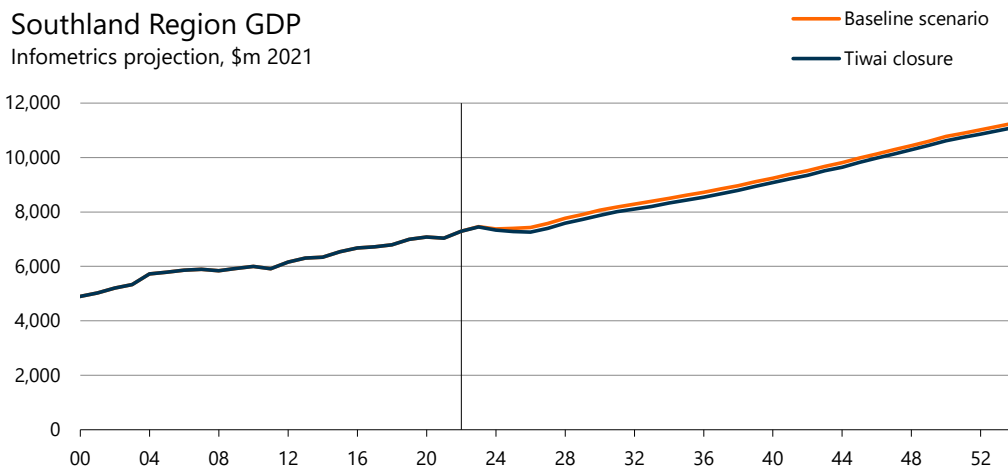
Graph 12



### Smelter closure causes a small, permanent hit to GDP

This difference in GDP growth will mean Southland Region’s annual GDP will be slightly lower than in the baseline scenario. In 2034, annual GDP is forecast to total \$8,325m, \$177m lower than if the smelter had remained open (Graph 13). By 2054, Southland Region GDP will reach \$11,115m, \$153m lower than the baseline scenario.

Graph 13



### Fewer technicians and trades workers if Tiwai closed

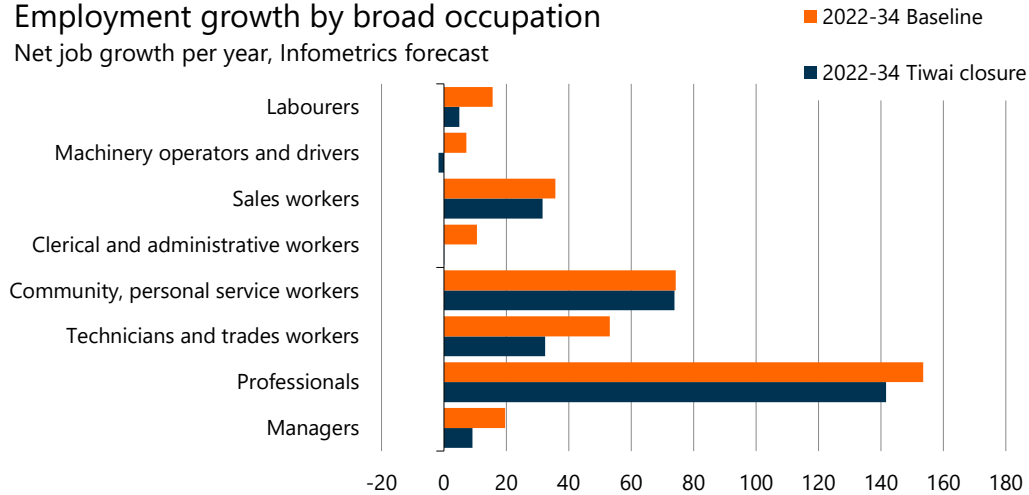
In the Tiwai closure scenario, employment across almost all occupations except for community and service workers, and sales workers, is affected. In particular, growth in the number of technicians in Southland Region is projected to average 32 per year between 2022 and 2034, 21 jobs per year fewer than under the baseline scenario (Graph 14). We also expect slower growth in the number of managers, professionals, clerical and admin workers, machinery operators, and labourers. These expectations are based on the assumed composition of aluminium smelting sub-industry at a national level, not the specific composition of the Tiwai workforce.



Graph 14

### Employment growth by broad occupation

Net job growth per year, Infometrics forecast



## Southern Green Hydrogen

### Modest employment boost from SGH

The development of a hydrogen and ammonia facility in Invercargill City is expected to have a modest impact on employment growth in the Southland Region overall, scaling up to 140 jobs in Invercargill City between 2026 and 2035, and holding at that level thereafter (Graph 15). The employment effect is relatively insignificant at a regional level, so we have not charted total regional employment levels or growth under this scenario.

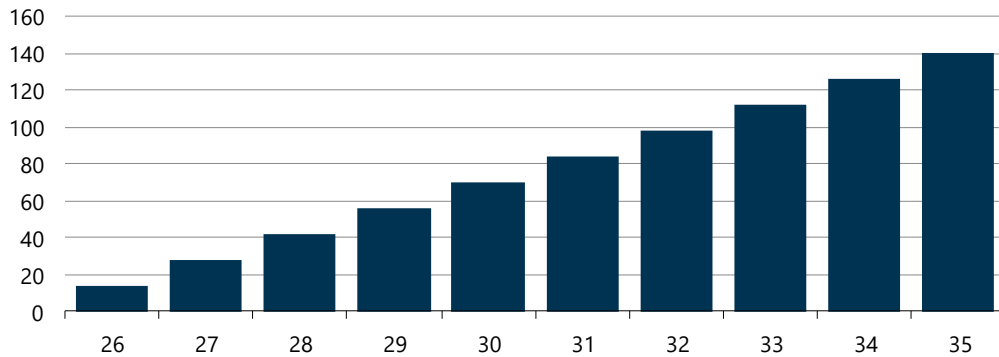
We would note that modelling for the Southern Green Hydrogen (SGH) scenario has not factored in construction employment. There would likely be a small, one-off burst in construction industry jobs during the development of the facility, however we are reticent to quantify the construction impact given limited information as to the scale of SGH, timing of construction and the proportion of equipment which would be imported.

We have not factored in the impact of 'head office' tasks being located within the Southland Region, but if this was the case, then the employment and GDP effect would be greater.

Graph 15

### Employment effect of Southern Green Hydrogen

Infometrics forecast



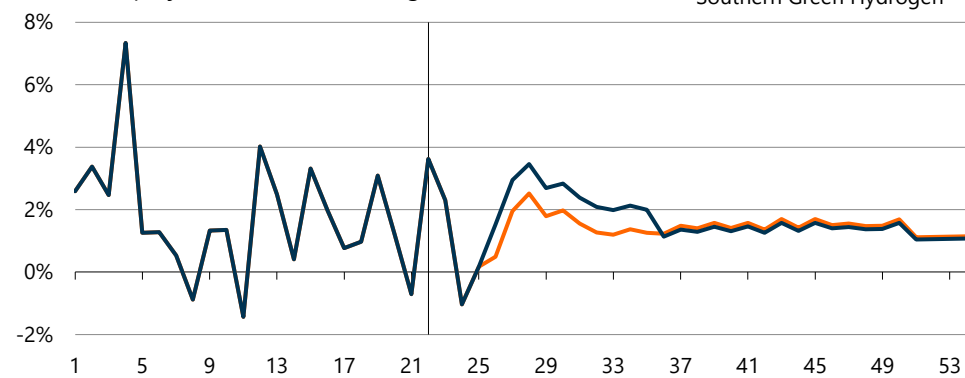
### SGH boosts GDP growth

SGH is expected to have a more noticeable effect on GDP growth, as there is expected to be a high level of GDP per worker. GDP growth is forecast to be faster than in the baseline scenario for the period 2026-35 (Graph 16). Over this nine-year period, GDP growth will rise to a peak of 3.5%pa in 2028, one percentage point above the baseline scenario. By 2036, GDP growth is expected to return to the same rate as in the baseline scenario.

Graph 16

### Southland Region GDP growth

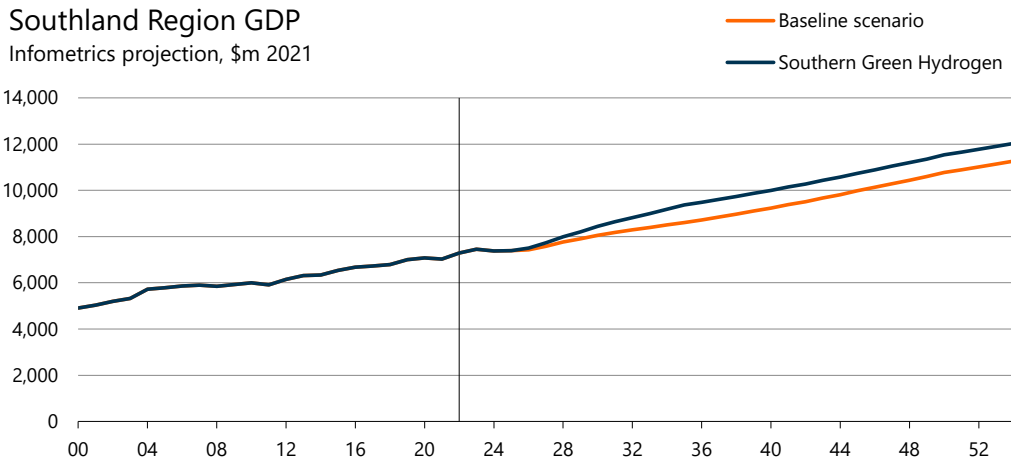
Infometrics projection, annual % change



### SGH lifts GDP by \$762m

This period of faster growth will cause a \$213m annual boost to Southland Region’s GDP. In 2034, we forecast that annual GDP in the Southern Green Hydrogen scenario will total \$9,189, which is \$687m greater than in the baseline scenario (Graph 17). By 2054, this gap will have widened to \$762m.

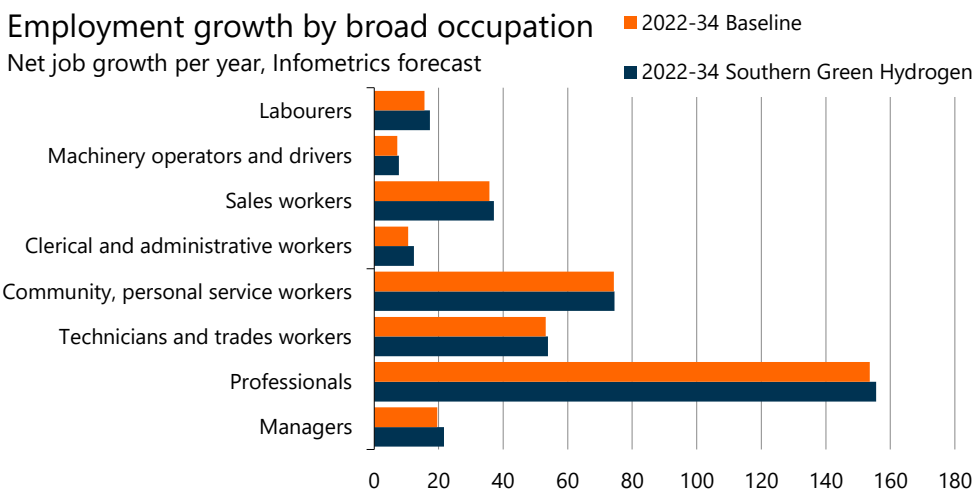
Graph 17



## SGH boosts high- and low-skilled occupations

Based on assumed occupation composition of the petroleum refining industry (an analogue for hydrogen generation) we expect the additional manufacturing jobs created by SGH will be concentrated in manager, professional, clerical and admin, and labouring occupations (Graph 18). This will translate to a higher number of highly-skilled (professional and managerial) workers compared to the baseline, and a higher number of low-skilled (clerical, admin, and labour) workers.

Graph 18



## Aquaculture

### Long-term boost of almost 3,000 jobs from aquaculture

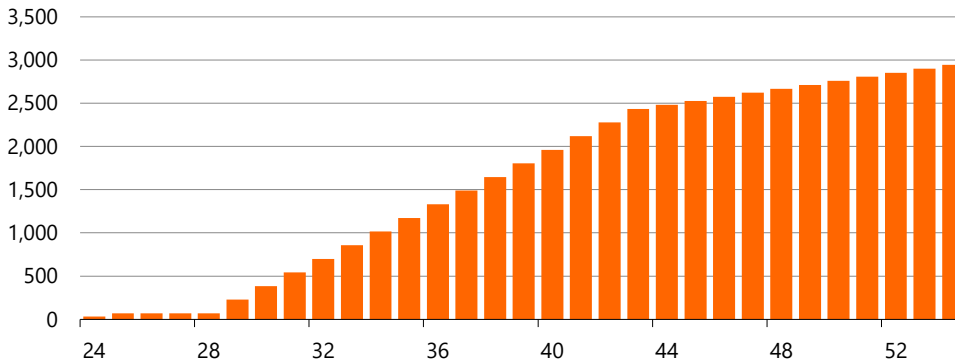
The expansion of on-shore and open-ocean aquaculture in Southland Region is projected to have a strong impact on employment, scaling up to 2,944 added jobs in Invercargill City over the forecast period. In 2034, employment in the aquaculture

scenario will total 61,064, which is 1,015 more jobs than in the baseline scenario (Graph 19). By 2054, employment in the aquaculture scenario is projected to total 67,203, almost 3,000 more jobs than in the baseline scenario.

Graph 19

### Employment effect of aquaculture scenario

Infometrics forecast



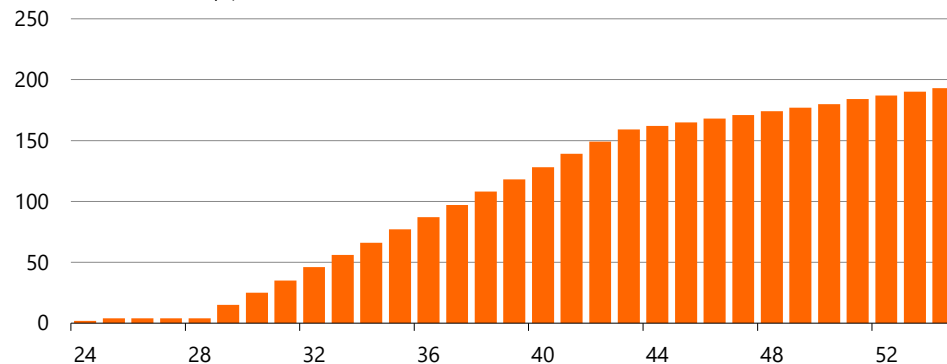
### Small GDP boost from aquaculture

The aquaculture scenario is projected to lift Southland Region GDP increasingly above the baseline scenario forecast. By 2034, annual GDP will total \$8,568m, which is \$66m above the baseline forecast (Graph 20). The gap will widen to \$193m by 2054. This increase is a modest boost to GDP, with annual GDP in 2054 just under 2% greater than in the baseline scenario.

Graph 20

### GDP effect of aquaculture scenario

Infometrics forecast, \$m 2021



## Summary of each scenario

The employment and GDP forecasts for each scenario are summarised in Table 3 and Table 4 below. This highlights that the Tiwai closure scenario has a perceptible effect on GDP and employment growth in the 2022-2034 period only, and results in a permanently lower level of GDP and employment in the region. The SGH scenario provides a modest boost to employment growth and more substantial boost to GDP

growth over the 2022-2034 period. Employment and GDP growth is virtually the same over 2034-2054 across the baseline, Tiwai closure and SGH scenarios. The aquaculture scenario features appreciably stronger GDP and employment growth throughout the projection period, concentrated in Invercargill City.

Table 3

**Employment growth by area and scenario**

Infometrics forecast

Area	Scenario	Employment level				Employment growth (annual average)		
		2010	2022	2034	2054	2010-2020	2022-2034	2034-2054
Southland District	Baseline	15,730	17,898	18,926	18,340	1.1%	0.6%	-0.2%
	Tiwai closure	15,730	17,898	18,921	18,335	1.1%	0.6%	-0.2%
	SGH	15,730	17,898	18,926	18,340	1.1%	0.6%	-0.2%
	Aquaculture	15,730	17,898	18,926	18,340	1.1%	0.6%	-0.2%
Gore District	Baseline	7,165	7,231	7,381	7,304	0.1%	0.2%	-0.1%
	Tiwai closure	7,165	7,231	7,381	7,304	0.1%	0.2%	-0.1%
	SGH	7,165	7,231	7,381	7,304	0.1%	0.2%	-0.1%
	Aquaculture	7,165	7,231	7,381	7,304	0.1%	0.2%	-0.1%
Invercargill City	Baseline	27,969	30,482	33,742	38,615	0.7%	1.0%	0.7%
	Tiwai closure	27,969	30,482	32,814	37,669	0.7%	0.7%	0.7%
	SGH	27,969	30,482	33,868	38,755	0.7%	1.1%	0.7%
	Aquaculture	27,969	30,482	34,757	41,559	0.7%	1.3%	0.9%
Southland Region	<b>Baseline</b>	<b>50,864</b>	<b>55,611</b>	<b>60,049</b>	<b>64,259</b>	<b>0.7%</b>	<b>0.8%</b>	<b>0.3%</b>
	<b>Tiwai closure</b>	<b>50,864</b>	<b>55,611</b>	<b>59,116</b>	<b>63,308</b>	<b>0.7%</b>	<b>0.6%</b>	<b>0.3%</b>
	<b>SGH</b>	<b>50,864</b>	<b>55,611</b>	<b>60,175</b>	<b>64,398</b>	<b>0.7%</b>	<b>0.8%</b>	<b>0.3%</b>
	<b>Aquaculture</b>	<b>50,864</b>	<b>55,611</b>	<b>61,064</b>	<b>67,203</b>	<b>0.7%</b>	<b>0.9%</b>	<b>0.5%</b>

Table 4

**GDP growth by area and scenario**

Infometrics forecast, \$m 2021

Area	Scenario	GDP level				GDP growth (annual average)		
		2010	2022	2034	2054	2010-2020	2022-2034	2034-2054
Southland District	Baseline	2,279	2,709	3,096	3,745	1.5%	1.3%	1.0%
	Tiwai closure	2,279	2,709	3,103	3,749	1.5%	1.4%	0.9%
	SGH	2,279	2,709	3,591	4,294	1.5%	2.9%	0.9%
	Aquaculture	2,279	2,709	3,096	3,745	1.5%	1.3%	1.0%
Gore District	Baseline	802	872	950	1,140	0.7%	0.9%	0.9%
	Tiwai closure	802	872	950	1,142	0.7%	0.9%	0.9%
	SGH	802	872	950	1,140	0.7%	0.9%	0.9%
	Aquaculture	802	872	950	1,140	0.7%	0.9%	0.9%
Invercargill City	Baseline	2,922	3,707	4,456	6,384	2.0%	1.9%	1.8%
	Tiwai closure	2,923	3,707	4,272	6,224	2.0%	1.4%	1.9%
	SGH	2,922	3,707	4,648	6,597	2.0%	2.3%	1.8%
	Aquaculture	2,922	3,707	4,522	6,577	2.0%	2.0%	1.9%
Southland Region	<b>Baseline</b>	<b>6,003</b>	<b>7,288</b>	<b>8,502</b>	<b>11,268</b>	<b>1.6%</b>	<b>1.6%</b>	<b>1.4%</b>
	<b>Tiwai closure</b>	<b>6,004</b>	<b>7,288</b>	<b>8,325</b>	<b>11,115</b>	<b>1.6%</b>	<b>1.3%</b>	<b>1.5%</b>
	<b>SGH</b>	<b>6,003</b>	<b>7,288</b>	<b>9,189</b>	<b>12,030</b>	<b>1.6%</b>	<b>2.3%</b>	<b>1.4%</b>
	<b>Aquaculture</b>	<b>6,003</b>	<b>7,288</b>	<b>8,568</b>	<b>11,461</b>	<b>1.6%</b>	<b>1.6%</b>	<b>1.5%</b>

# Population

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## Our approach

### Consideration of each life stage and cohort

Our population projection approach follows a traditional cohort component projection approach, in which the starting population is broken up into age and gender cohorts. Each cohort is analysed and projected separately – considering the probabilities of different life events for each cohort in each five-year period. The life events include fertility, mortality, migration, household formation, and labour force participation. We also consider how these probabilities have changed over time and how they may change in future – for example, how labour force participation has risen among older age groups as life expectancy has extended over time.

### Employment forecasts drive net migration

Our key point of difference for our population projections is that our employment forecasts inform projected net migration. We consider employment growth and labour force participation to assess labour force shortfalls in each region, which indicates how net migration will be distributed within the country. Consequently, these population projections are essentially informed by the economic prospects of the region.

### Districtwide first, then sub-district

We project population at a districtwide scale first, in consideration of demographic processes and employment growth. Then, we project population at a Statistical Area 2 (SA2) or settlement scale taking into account historical trends.

Our projection approach is described in greater detail in Appendix 1 – our approach in detail.

## Drivers of population change

### International net migration to recover slowly

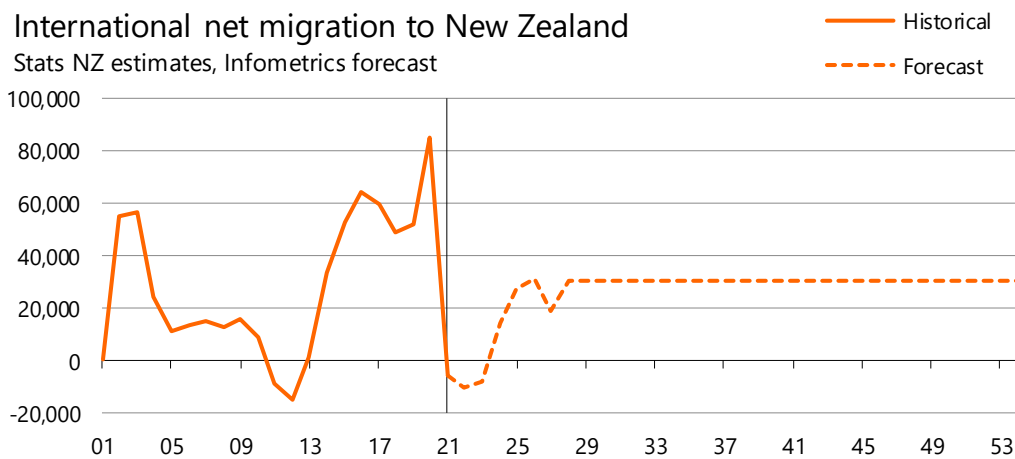
International net migration rose to record highs in the 2010s, and a further record high in 2021 as expat New Zealanders rushed home ahead of the COVID-19 border restrictions (Graph 21). This was followed by a sharp fall in net migration while the border was closed.

Despite a progressive loosening of migration settings as New Zealand's international border reopened in 2022, a highly competitive global market for labour is expected to limit migration inflows, at the same time as an elevated number of New Zealanders are leaving. Net migration is forecast to trend back to its long-term level of 30,000 per annum later in this decade.

This net migration projection reflects that under our forecast of steady employment growth and an ageing population, we expect sustained positive net migration over the

long term. Although New Zealand does not currently have a long-term immigration strategy, we expect that labour market pressures will persuade future governments to enable sustained, moderate net migration flows through favourable migration settings. However, we do not expect net migration to return to the highs observed in the past decade, given the highly competitive global market for migrants, as many countries face an ageing population.

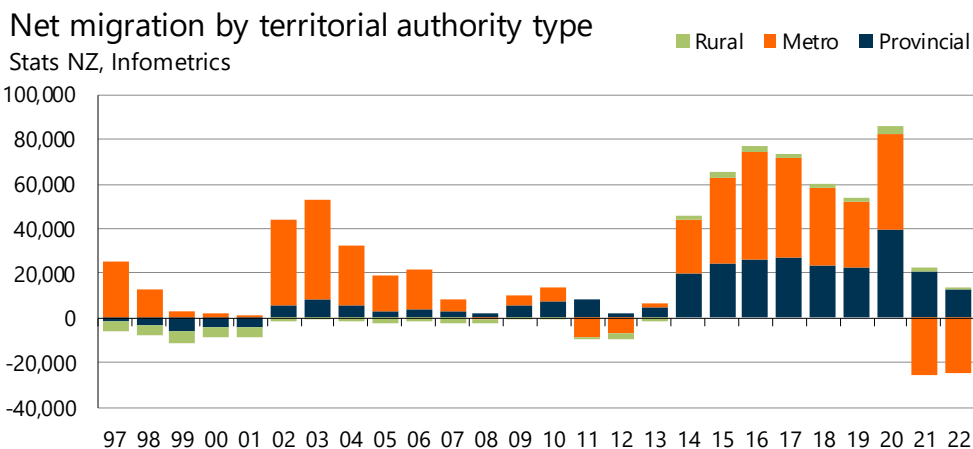
Graph 21



## Distribution of regional net migration shifts

Over the 1990s and 2000s, periods of high international net migration largely translated to periods of high net migration into New Zealand's metropolitan centres. For example, when international net migration peaked (at the time) in 2003 at 51,500pa, metro centres took 86% of the country's net migration, and rural areas continued to experience net outflows (Graph 22). However, by the 2010s, the distribution of population across our metropolitan, provincial (including Invercargill City) and rural (including Southland and Gore Districts) areas fundamentally changed. Between 2014 and 2020, 57% of net international migration went to the metro centres, allowing provincial and rural areas to make substantial net migration gains and therefore arrest population decline which dated back to the economic reforms of the 1980s. This change was driven by a combination of factors – extremely strong net migration volumes which exceeded housing capacity in the metropolitan centres, rising unaffordability of housing which has pushed commuters further out from cities, and emphasis on regional migration in work visa rules. Improved internet connectivity and greater options for remote working have likely aided this change too.

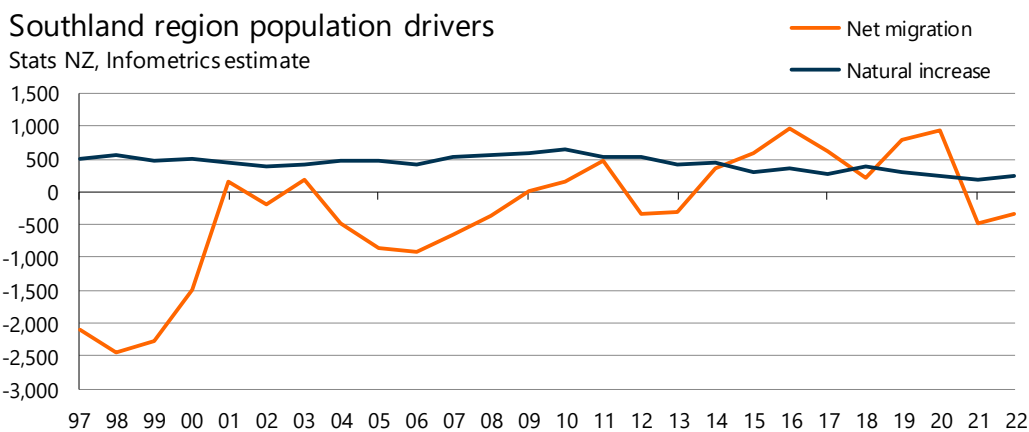
Graph 22



## Shifts in migration benefit Southland

Shifts in the volume and distribution of net migration nationally benefited Southland, with a seven-year period of net migration gain for the region (Graph 9). This comes after two decades of substantial net migration losses. Net migration into Southland turned negative in 2021 and 2022 while international borders were closed for the pandemic.

Graph 23



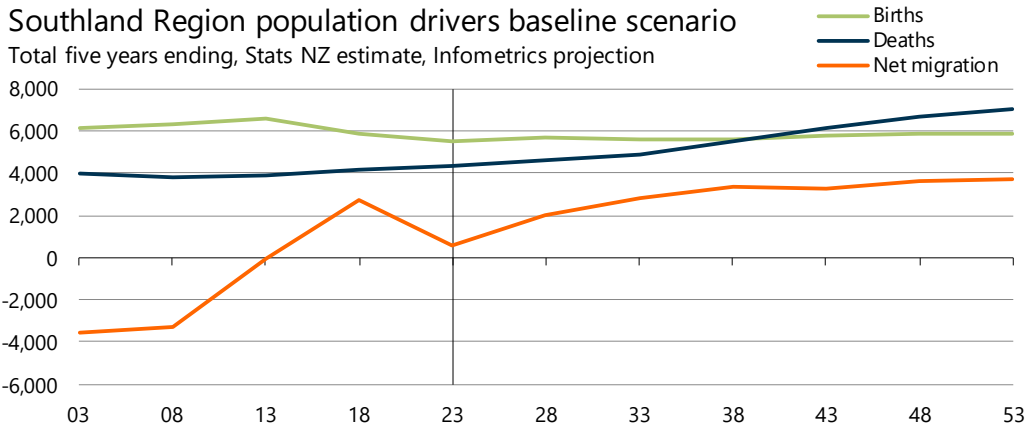
Over the past decade, an ageing population has led to a softening in natural increase, the margin between births and deaths. As the population has aged and birth rates eased, the number of births has eased slightly. At the same time, deaths have grown as an increasing proportion of the population is in their later years. Although natural increase is less volatile than net migration, its long-term shifts can be just as significant.

## Drivers of population growth shift over time

Natural increase is expected to become negative in Southland Region in the 2040s, and nationally in the 2050s (Graph 24). From this point onwards, deaths will outnumber births, and the population will decline unless there is significant net migration gain. A strong level of net migration is expected to come into the region to fill labour force shortfalls, increasing over time to fill the gap left by negative natural increase.



Graph 24

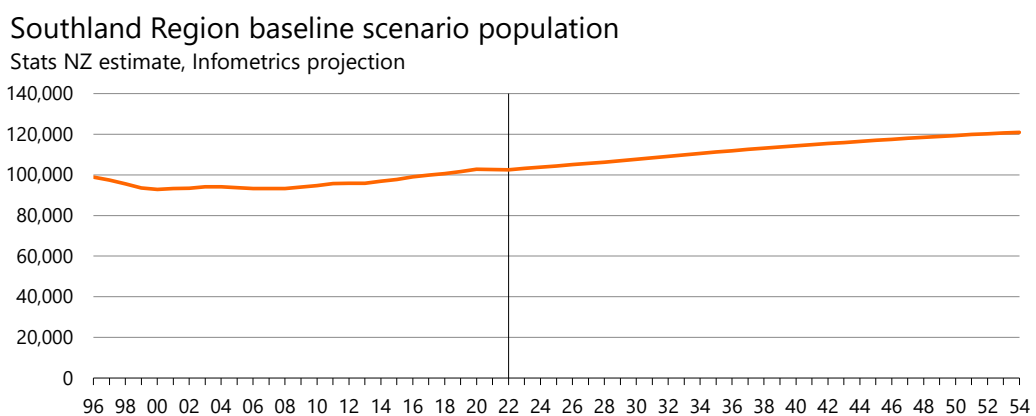


## Baseline scenario

### Region’s population over 120,000 by 2054

Southland Region’s population is estimated to be 102,400 as at 2022, up from 95,800 in 2012. The population is expected to reach 110,492 by 2034 and grow at a diminishing rate to 120,929 at 2054 (Graph 25). We expect that in Invercargill City, the region’s major urban hub, population growth will remain positive throughout the forecast period, while population growth in Southland District and Gore District will turn negative in the 2040s. This differential reflects a differential in the employment forecasts, with a stronger outlook for jobs in Invercargill than the rest of the region. As a result, Invercargill City will increase its share of Southland Region’s population from 55% in 2022, to 56% in 2032, and 60% in 2054.

Graph 25

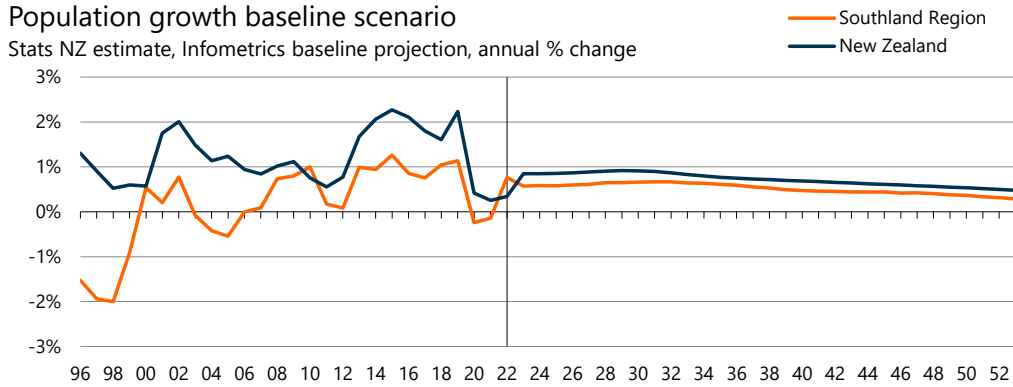


### Southland’s population growth to lag New Zealand

Southland Region’s population growth has historically lagged New Zealand overall, and this is expected to persist throughout the projection period. Southland Region population growth is projected to sit between 0.5%pa to 0.6%pa throughout the mid-2020s to the mid-2040s and slow thereafter (Graph 26). We expect population growth to

ease to 0.4%pa in 2044 and 0.3%pa in 2052. Population growth across New Zealand is expected to remain slightly ahead, slowing from 0.9%pa in the mid-2020s to 0.6%pa by 2045, and 0.5%pa by the early 2050s.

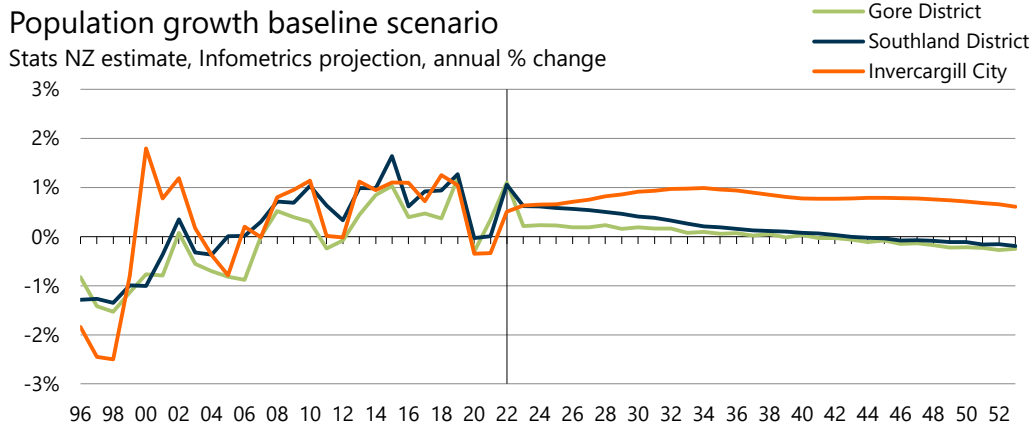
Graph 26



### Strongest population growth in Invercargill

Invercargill City is forecast to lead population growth in the region (Graph 27). We expect that as population growth slows in Southland and Gore Districts throughout the projection period, population growth in Invercargill City will rise to a peak of 1.0%pa in the mid-2030's and begin easing thereafter. Population growth is expected to turn negative in both Southland and Gore Districts in the mid-2040s, with both districts forecast to see a population decline of 0.2%pa at the end of the projection period.

Graph 27

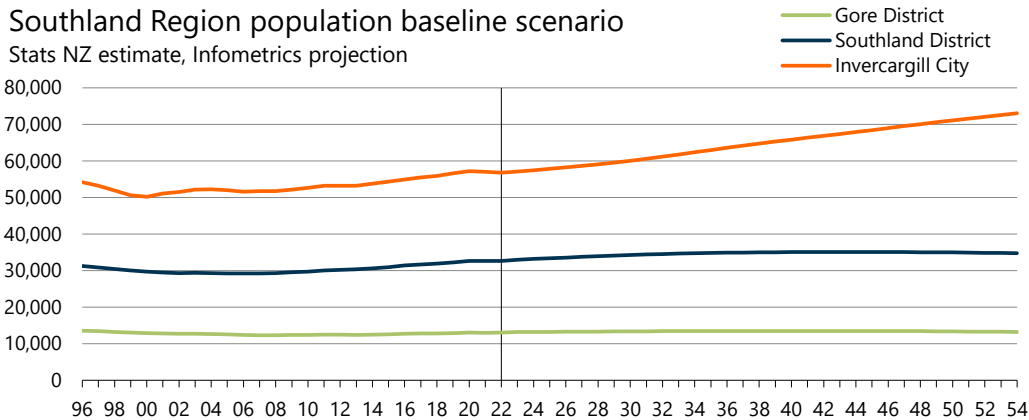


### Invercargill population over 73,000 by 2054

The population of Invercargill City is expected to rise from an estimated 56,800 in 2022, to 62,359 in 2034, and reach 73,006 at the end of the projection period (Graph 28). The population of Southland District, estimated to be 32,592 in 2022, will increase slowly to a peak of 35,086 in 2043, and begin declining thereafter to 34,725 in 2054. In Gore District, which is expected to see the weakest population growth of Southland Region's three territorial authorities, the population is expected to reach a peak of 13,460 in 2041 and

ease to 13,198 by the end of the forecast period. The differential between Southland District and Gore District reflects Gore’s slightly softer employment outlook.

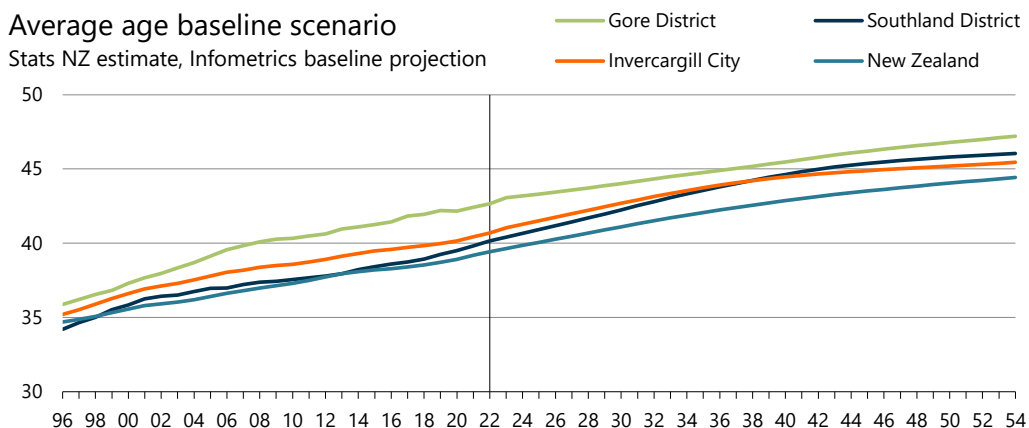
**Graph 28**



### Average age rises everywhere

Across both Southland Region and New Zealand, a rising proportion of people aged over 65 will lead to an increase in the average age. Gore District has the oldest population structure within the region, with an estimated average age of 42.7 in 2022 that is expected to reach 47.2 at the end of the forecast period (Graph 29). The average age in Invercargill City, which currently has the second oldest age structure of the three territorial authorities, is expected to rise from 40.7 in 2022, to 45.4 in 2054. Southland District is expected to overtake Invercargill City’s average age in the late-2030s, lifting from 40.1 in 2022 to 46.0 in 2054. Net migration typically brings in younger age groups, with stronger net migration into Invercargill bringing the city’s average age below Southland District in the 2030s. The average age across the region will remain above the New Zealand average, which is expected to be 44.4 at the end of the forecast period.

**Graph 29**



## Over-65's grow from 19% to 27% of region's population

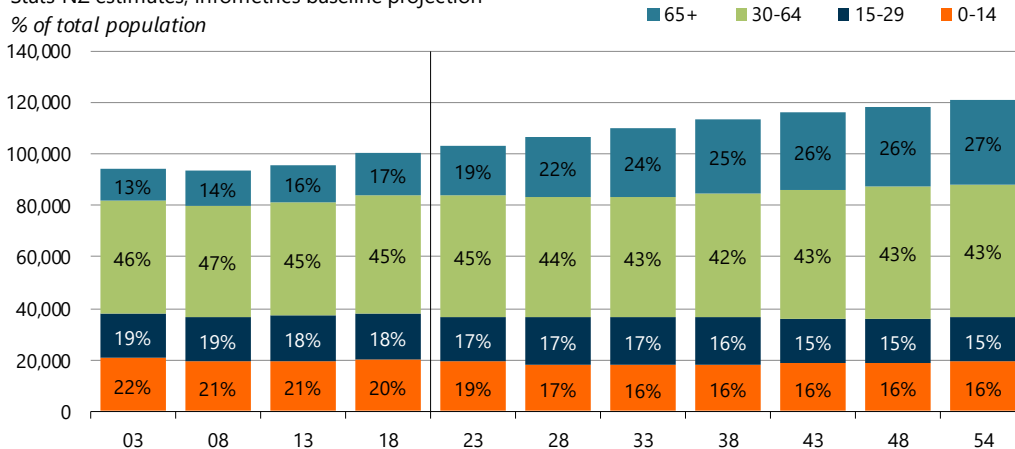
The increase in average age in Southland Region comes as a result of a rising proportion of people aged 65 and over. We expect the number of people aged 65 and older to increase from 19,471 (19% of total) in 2023, to 32,690 (27%) in 2054 (Graph 30).

Despite growth in the number of people aged 30-64 from 46,843 in 2023, to 51,400 in 2054, their share eases from 45% of the total population in 2023 to 43% in 2054. The number of 15-29-year-olds is projected to stay relatively steady, shifting from 17,678 in 2023 to 17,708 in 2054. The number of 0-14-year-olds is expected to decline slightly from 19,181 in 2023 to 19,131 in 2054, reducing their share of the total population from 19% to 16%.

Graph 30

### Southland Region population by age in baseline scenario

Stats NZ estimates, Infometrics baseline projection



The overall working-age population (15-64) is expected to increase from 64,521 in 2023 to 69,108 in 2054, however their share of the total population will fall from 63% to 57% over the period due to the large increase in over 65s.

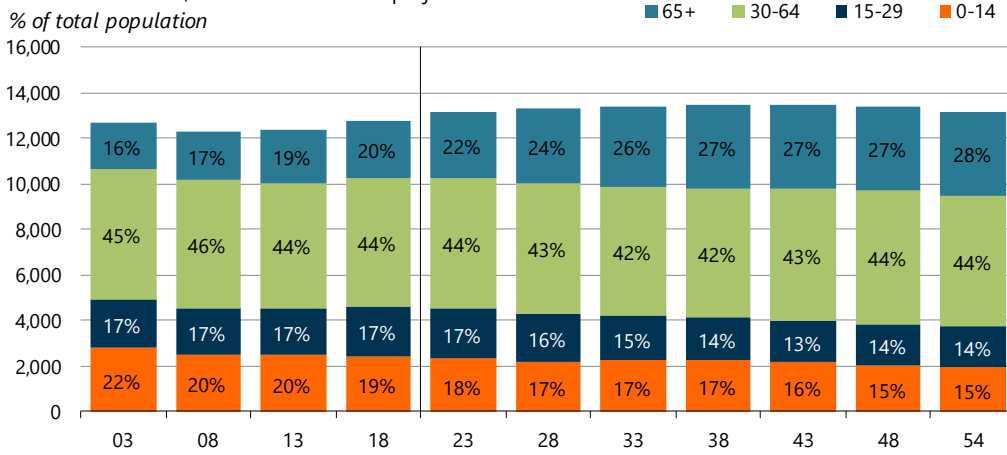
## Gore population remains region's oldest

Gore District has the largest proportion of over 65s of Southland Region's three territorial authorities. We expect this to remain true over the forecast period, causing the working-age share of the population to decline from 60% in 2023, to 57% in 2054. The number of people aged over 65 is expected to increase from 2,891 in 2023, to 3,693 in 2054, while the number of 30-64-year-olds increases slightly from 5,741 to 5,762 (Graph 31). The share of under 30s is forecast to fall from 34% to 28% between 2023 and 2054, with the number of 0-14-year-olds and 15-29-year-olds each falling by almost 400.

Graph 31

Gore District population by age in baseline scenario

Stats NZ estimates, Infometrics baseline projection



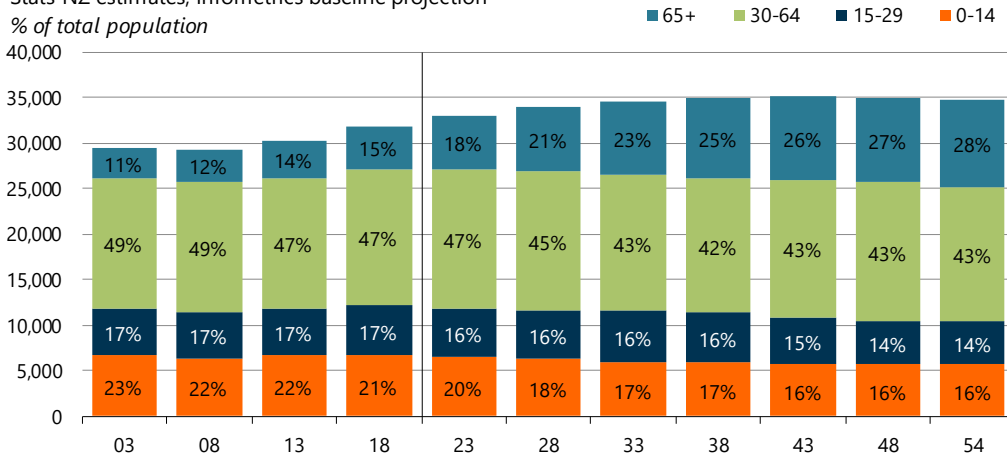
Largest increase in over-65 share in Southland

Southland District is expected to see the largest percentage point increase in the share of over 65s across the three territorial authorities. The number of over 65s in Southland District is expected to increase by from 5,790 to 9,575 between 2023 and 2054, lifting their share of the total population from 18% to 28% (Graph 32). The number of 30–64-year-olds is expected to fall from 15,419 to 14,766 over this period, reducing their share of the total population from 47% to 43%. This decline, in addition to a fall in the number of 15–29-year-olds from 5,231 to 4,724, will see the overall working age population fall by over 1,100 people. The share of the population aged under 30 will fall from 36% to 30% over 2023–54 as the number of 15–29-year-olds falls by almost 500, and the number of 0–14-year-olds by over 800.

Graph 32

Southland District population by age in baseline scenario

Stats NZ estimates, Infometrics baseline projection



## All age groups grow in Invercargill

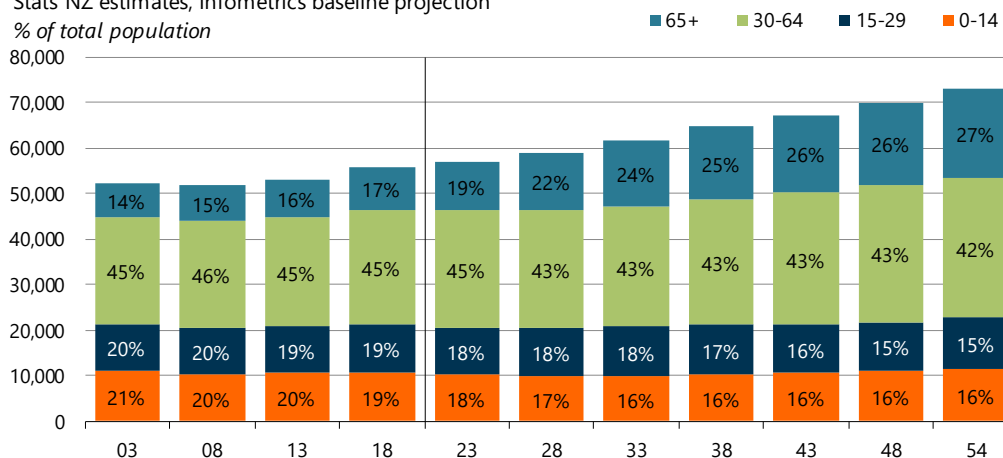
Invercargill City is the only territorial authority in Southland Region expected to record positive population growth over the entire forecast period. We expect the number of people in all groups to increase between 2023 and 2054. The most rapid growth will be in the number of over-65s, which is expected to grow from 10,790 in 2023 to 19,422 in 2054 (Graph 33), lifting their share of the population from 19% to 27%. We expect more moderate growth from the 30-64 age group, increasing from 25,683 in 2023 to 30,872 in 2054. The share of the population aged under 30 will reduce from 36% to 31% as the number of 0-14-year-olds and 15-29-year-olds increases more slowly than the other age groups, growing by approximately 1,200 and 900 respectively. Between 2023 and 2054, we expect an overall increase of around 6,100 people in the working age population.

Graph 33

### Invercargill City population by age in baseline scenario

Stats NZ estimates, Infometrics baseline projection

% of total population



## Sub-district population growth

We have projected sub-district population growth which builds upon Stats NZ's subnational population projections, historical trends in each sub-district area or settlement, and our overall population projections in the baseline scenario. We have also considered the Southland Housing Needs Assessment – Community Survey which noted a slight net preference towards moving away from rural areas and towards larger towns. This process has not considered the capacity for development in each area or known upcoming developments.

## Gore District growth concentrated in Gore township

Within Gore District, growth is expected to be concentrated in Gore township, although the level of growth will be modest reflecting the soft population growth outlook for the district overall. Gore township has been leading the district's growth and is projected to continue, with growth of 0.4%pa over the 2022-2034 period, followed by 0.1%pa over 2034-54 as the district's overall population growth turns negative (Table 5). Mataura has seen negligible growth over the past decade and is expected to hold steady up to 2034, declining thereafter as the population already in the community ages further. Gore District's rural population is ageing quickly and has seen negligible growth over the past 20 years. In addition, Gore's rural population is expected to be dented under the

baseline scenario with a softer outlook for agricultural employment. Gore's rural population is projected to start declining 0.1%pa in the 2022-2034 period, and further by 0.4%pa in the 2034-2054 period.

Table 5

**Sub-district population**

Stats NZ estimates, Infometrics baseline projection

Area	Population level			Population growth (annual % change)	
	2022	2034	2054	2022-2034	2034-2054
<b>Gore district</b>	<b>13,000</b>	<b>13,418</b>	<b>13,198</b>	<b>0.3%</b>	<b>-0.1%</b>
Gore	8,216	8,664	8,844	0.4%	0.1%
Mataura	1,717	1,722	1,578	0.0%	-0.4%
Gore rural	3,066	3,034	2,775	-0.1%	-0.4%
<b>Southland district</b>	<b>32,600</b>	<b>34,715</b>	<b>34,725</b>	<b>0.5%</b>	<b>0.0%</b>
Te Anau	2,982	3,311	3,439	0.9%	0.2%
Manapouri	245	291	318	1.5%	0.4%
Winton	2,453	2,583	2,748	0.4%	0.3%
Riverton	1,679	1,930	2,169	1.2%	0.6%
Tuatapere	537	493	379	-0.7%	-1.3%
Otautau	774	792	756	0.2%	-0.2%
Edendale/Wyndham	1,252	1,387	1,499	0.9%	0.4%
Lumsden	541	565	571	0.4%	0.0%
Riversdale	430	448	433	0.3%	-0.2%
Wallacetown	766	904	1,007	1.4%	0.5%
Stewart Island	321	427	515	2.4%	0.9%
<b>Invercargill city</b>	<b>56,800</b>	<b>62,359</b>	<b>73,006</b>	<b>0.8%</b>	<b>0.8%</b>
Bluff	1,861	1,966	2,075	0.5%	0.3%

**Stronger growth in Fiordland**

Stronger population growth is projected in Fiordland than Southland District overall, reflecting the stronger employment outlook for tourism than agriculture across the district. Te Anau's population is projected to grow 0.9%pa over 2022-2034 (0.5%pa across Southland District) and 0.2%pa over 2034-2054 (0%pa across Southland District). Manapouri is projected to grow 1.5%pa over 2022-2034, then 0.4%pa over 2034-2054.

Towns which are proximate to Invercargill, such as Edendale/Wyndham and Wallacetown are also projected to fare better, reflecting the availability of jobs nearby with a relatively strong employment outlook for Invercargill City. Winton is buoyed a strong established commuting pattern into Invercargill, as well as a degree of critical mass, particularly compare to some of the district's smaller rural towns. Riverton is projected to continue growing steadily, reflecting established commuting patterns into Invercargill, strong recent historical growth and intentions to move there noted in the housing survey.

Across the rest of Southland District, softer growth is projected in more agriculturally-focused and remote settlements, reflecting the weaker outlook for employment in agriculture. Tuatapere, Riversdale and Otautau are projected to decline over 2034-2054. Winton is projected to fare slightly better, reflecting its scale gives it a degree of critical mass despite the strong influence of agriculture on the town.

## Bluff to grow, but lag Invercargill

Bluff's population has stabilised after decline in the early 2000's, and featured favorably in the community survey as a place to move to over the next decade. However, with a rapidly ageing population, Bluff's population growth is likely to be muted relative to Invercargill City overall. Bluff is projected to grow 0.5%pa over 2022-2034 (Invercargill City 0.8%) and 0.3% over 2034-2054 (Invercargill City 0.8%). In the aquaculture scenario, which sees an expansion of aquaculture capacity out of Bluff, accelerated population growth could take place if supported by growth in housing capacity.

## Population scenarios

We have developed a population projection for each forecast scenario, which reflects the different levels of employment growth in each scenario and their effect on the need for net migration into each territorial authority in the region. There is a degree of flexibility in the relationship between employment and population, which reflects that workers can commute in between the three territorial authorities in the region, especially in the short term. Differences in net migration can have knock-on effects on population many years later, as workers who migrate into the region may have children after they settle.

### Fastest population growth in aquaculture scenario

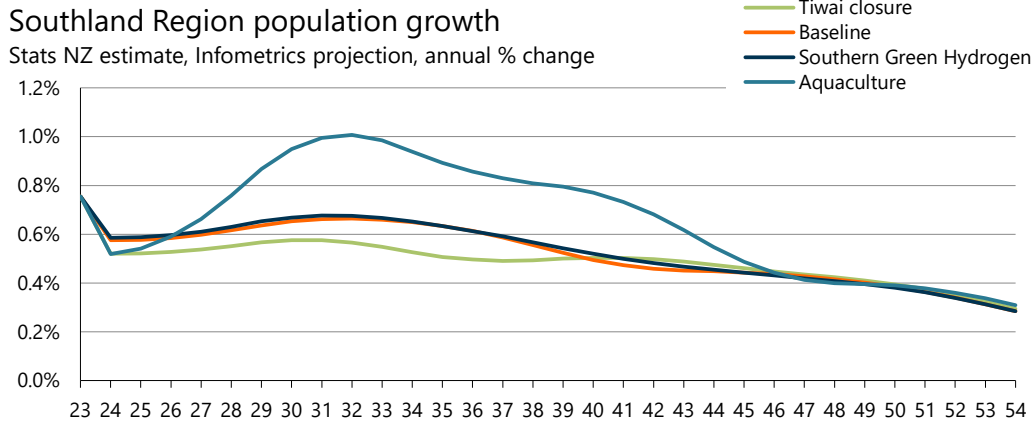
Compared to the baseline scenario, the expansion of on-shore and open-ocean aquaculture in Southland Region would lead to broadly faster population growth until the mid-2040's, with the rate of population growth then beginning to converge. We expect population growth across the region in the aquaculture scenario to peak at 1.0%pa in 2032, 0.3 percentage points ahead of the forecast baseline scenario growth rate that year (Graph 34).

The Tiwai closure scenario leads to accelerated job losses in manufacturing, and this in turn leads to slower population growth compared with the baseline scenario. Population growth in the Tiwai closure scenario is expected to remain around 0.1 percentage points below baseline population growth until the late 2030's, before beginning to converge.

The SGH scenario has a relatively small employment effect, which makes population growth very similar to that of the baseline scenario.



Graph 34

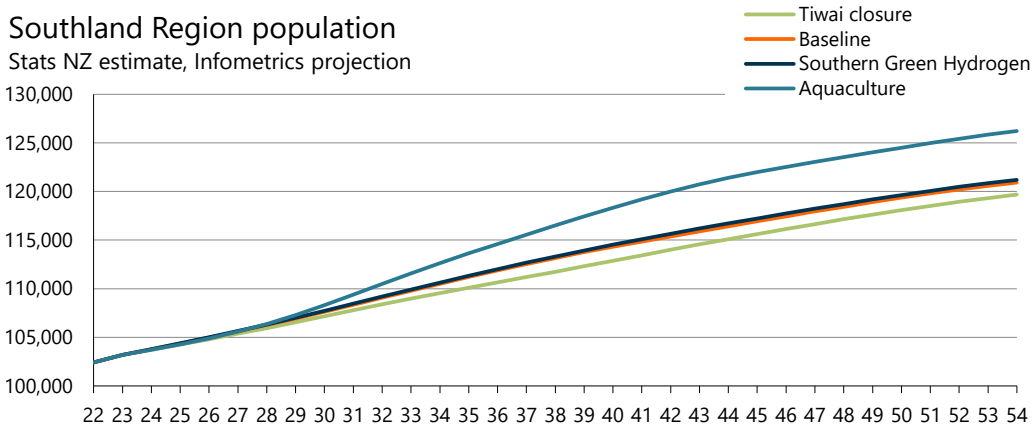


### Lowest population if Tiwai closed

These differences in population growth will mean that the population of Southland Region will be significantly higher than baseline if aquaculture is expanded, and slightly lower in the Tiwai closure scenario. By 2034, the projected population in the aquaculture and Tiwai closure scenarios are 112,634 and 109,551 respectively. These population projections compare to 111,194 in the baseline scenario in 2034.

By 2054, the population of Southland Region in the aquaculture scenario is expected to total 126,241, which is 5,313 more people than in the baseline scenario. The region’s population in the Tiwai closure scenario is expected to total 119,682, which is 1,246 fewer people than in the baseline scenario.

Graph 35



Overall, the aquaculture scenario is projected to cause faster population growth, and therefore a higher population, compared with the baseline scenario (Table 6). We expect there to be an additional 178 people per year on average added to the Southland Region population between 2034 and 2054 compared with the baseline scenario. The development of the Southern Green Hydrogen facility is expected to add an additional 12 people per year over 2034-54 compared with the baseline scenario, and the closure of Tiwai Point will result in 79 fewer people per year added to the population. We note

that population figures are indicative, assuming that workers employed in an area in each scenario reside within that area.

Table 6

**Population by area and scenario**

Stats NZ estimates, Infometrics projection

Area	Scenario	2010	Population level			Population growth (annual average)		
			2022	2034	2054	2010-2022	2022-2034	2034-2054
Southland District	Baseline	29,700	32,600	34,713	34,725	0.8%	0.5%	0.0%
	Tiwai closes	29,700	32,600	34,715	34,727	0.8%	0.5%	0.0%
	SGH	29,700	32,600	34,713	34,724	0.8%	0.5%	0.0%
	Aquaculture	29,700	32,600	34,713	34,725	0.8%	0.5%	0.0%
Gore District	Baseline	12,400	13,000	13,420	13,197	0.4%	0.3%	-0.1%
	Tiwai closes	12,400	13,000	13,421	13,206	0.4%	0.3%	-0.1%
	SGH	12,400	13,000	13,419	13,196	0.4%	0.3%	-0.1%
	Aquaculture	12,400	13,000	13,420	13,197	0.4%	0.3%	-0.1%
Invercargill City	Baseline	52,600	56,800	62,362	73,006	0.6%	0.8%	0.8%
	Tiwai closes	52,600	56,800	61,415	71,749	0.6%	0.7%	0.8%
	SGH	52,600	56,800	62,499	73,274	0.6%	0.8%	0.8%
	Aquaculture	52,600	56,800	64,501	78,320	0.6%	1.1%	1.0%
Southland Region	<b>Baseline</b>	<b>94,700</b>	<b>102,400</b>	<b>110,494</b>	<b>120,928</b>	<b>0.7%</b>	<b>0.6%</b>	<b>0.5%</b>
	<b>Tiwai closes</b>	<b>94,700</b>	<b>102,400</b>	<b>109,551</b>	<b>119,682</b>	<b>0.7%</b>	<b>0.6%</b>	<b>0.4%</b>
	<b>SGH</b>	<b>94,700</b>	<b>102,400</b>	<b>110,632</b>	<b>121,195</b>	<b>0.7%</b>	<b>0.6%</b>	<b>0.5%</b>
	<b>Aquaculture</b>	<b>94,700</b>	<b>102,400</b>	<b>112,634</b>	<b>126,241</b>	<b>0.7%</b>	<b>0.8%</b>	<b>0.6%</b>

# Households

## Our approach to projecting households

We apply Stats NZ projected Living Arrangement Type Rates (LATR) – essentially household formation rates - for each territorial authority to our population projections to form household projections. This provides an indication of demand for housing, given the age structure of the population, assuming that sufficient dwellings are available. If insufficient dwellings are available, then household formation may be affected, for example, with multiple generations of a family living in a single dwelling.

A more thorough explanation of the process is detailed in Appendix 1 – our approach in detail

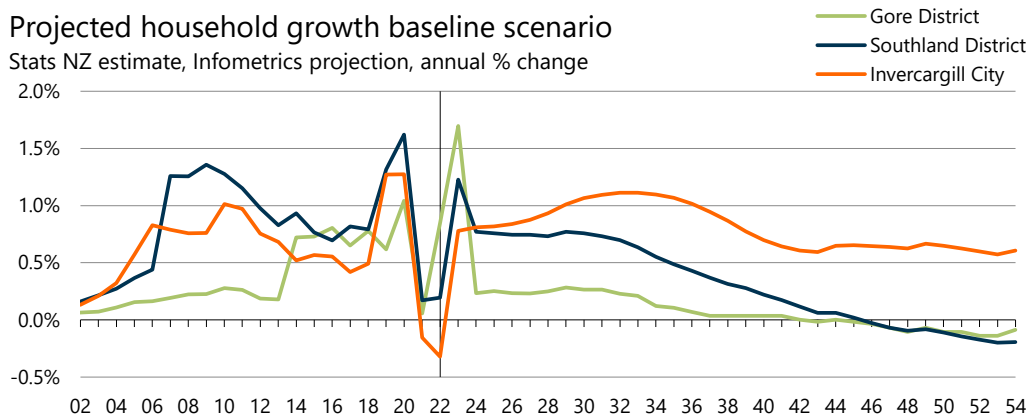
## Fastest household growth in Invercargill

Household growth is expected to reach a peak of 1.1%pa in 2032 in Invercargill City, and remain positive over the forecast period (Graph 36). We expect household growth in Invercargill City to slow down over time, easing to 0.7%pa in 2040 and remaining in the 0.6-0.7%pa range until the end of the forecast period.

Gore District's household growth is expected to spike to 1.7%pa in 2023, reflecting a resumption in population growth as international borders reopen. Household growth is expected to taper off rapidly, reaching a second, much lower peak of 0.3%pa in 2029 and easing thereafter. We expect the number of households in Gore District to begin declining slowly in the late 2040's.

A similar spike in household growth is expected in Southland District, at 1.2% in 2023. We expect household growth to soften to 0.8%pa by 2024 and turn negative in the late 2040s.

Graph 36



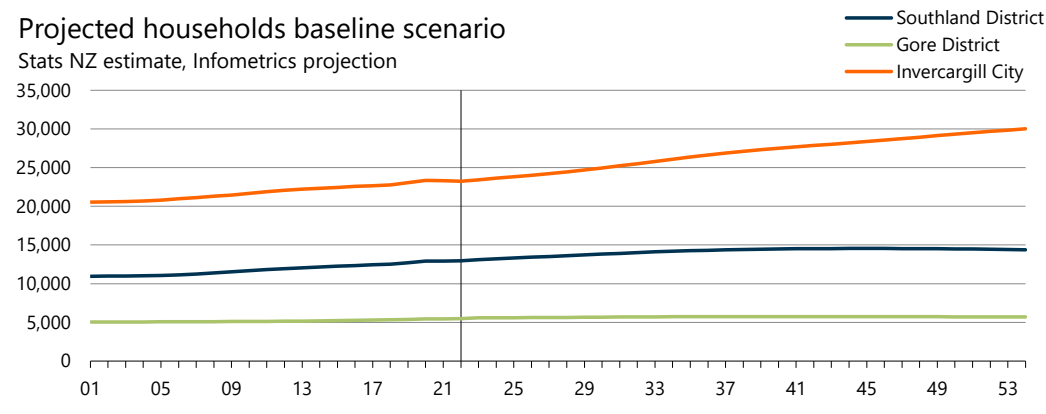
## Southland Region households reach over 50,110

The total number of households in Southland Region in 2022 is estimated to be 41,689, 56% of which are in Invercargill City, and 31% in Southland District (Graph 37). We

expect the number of households in Invercargill City to climb from 23,256 in 2022, to 26,087 in 2034, and reach 30,034 in 2054. This growth will bring Invercargill's share of the region's households to 60%.

The number of households in Southland District is expected to increase gently from 12,953 in 2022 to a peak of 14,548 in 2045, easing to 14,389 in 2054. The number of households in Gore District will remain relatively flat, rising from 5,480 in 2022 to 5,687 by the end of the forecast period. In total, the number of households in the region will reach just over 50,110.

Graph 37



## Average household size falls everywhere

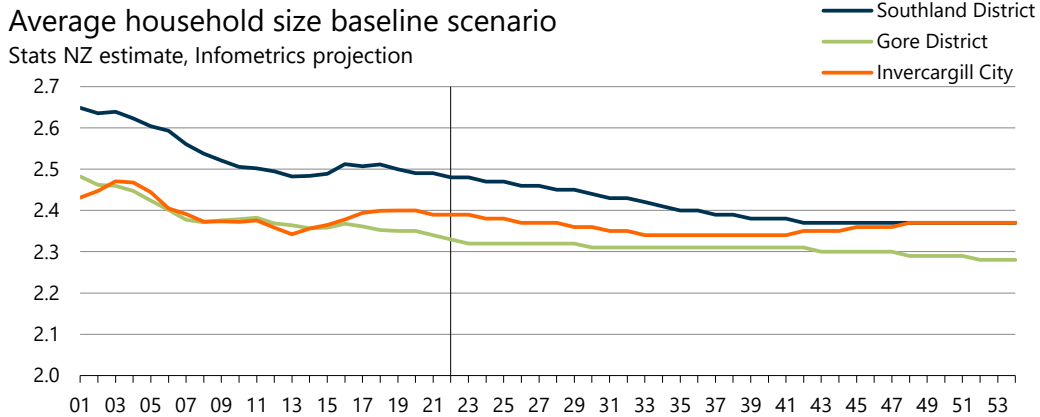
Long term trends such as increased numbers of childless couples and delaying having children till later in life have caused the average household size to decrease over time across New Zealand. Older age groups are more likely to form small, one- or two-person households, which also brings the average household size down over time as the population ages. We expect the average household size to also continue declining across Southland Region over the forecast period.

The estimated average household size in Southland District, which currently is the largest in the region, is expected to fall from 2.48 in 2022 to 2.37 in 2042, and remain at this size for the remainder of the forecast period (Graph 38). This reflects that Southland District is projected to have the steepest increase in average age in the region.

We expect the average household size in Invercargill City to also stabilise at 2.37 at the end of the forecast period, after having eased from 2.39 in 2022 to a low of 2.34 in the late 2030s. The average household size in Gore District is expected to decline more steadily, falling from 2.33 in 2022 to 2.28 by the 2050s. A particularly small average household size in Gore District is related to the older population structure in the area.

Although these are fairly small changes in average household size, it is an important contributor to the increasing number of households being formed, in addition to those created through population growth.

Graph 38



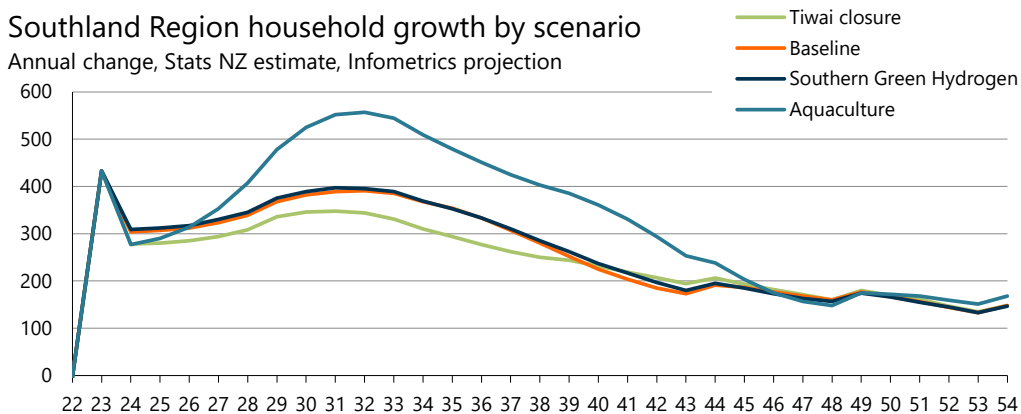
## Household scenarios

We have developed projections of household growth based on the different population projections for each scenario and the same projected household formation rates.

### Slowest household growth if Tiwai closed, fastest if aquaculture expanded

Annual household growth is projected to exceed the baseline scenario from the mid 2020's to the late 2040's, peaking at 557 new households in 2032. For comparison, in the baseline scenario, we expect 391 new households in Southland Region in 2032. In the Tiwai closure scenario, annual household growth peaks at 348 new households in 2031, 41 fewer than in the baseline scenario. In 2054, we expect just shy of 150 new households in all scenarios except aquaculture, which would add 168 new households to the region.

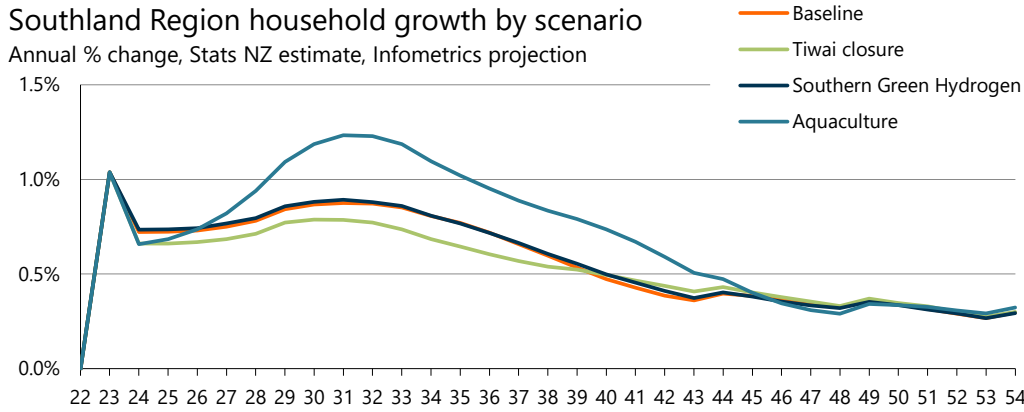
Graph 39



In percentage growth terms, household growth peaks at 1.2%pa in 2032 in the aquaculture scenario. That year, projected household growth is 0.9%pa in the baseline scenario, and 0.8%pa in the Tiwai closure scenario. Household growth converges to

0.3%pa in the late 2040's across the scenarios, with aquaculture scenario growth fractionally above the baseline.

Graph 40



### Strongest household growth in the coming decade

Higher employment and a higher population, coupled with falling household size, will imply more rapid household growth in the next decade as compared to the baseline scenario (Table 7). Conversely, we expect lower employment and population in the Tiwai closure scenario, meaning the total number of households by the end of the forecast period will total around 500 fewer than in the baseline scenario. We note that these household figures are indicative, assuming that workers employed in an area in each scenario reside within that area.

Table 7

**Households by area and scenario**

Stats NZ estimate and Infometrics projection

Area	Scenario	Number of households				Household growth (annual average)		
		2010	2022	2034	2054	2010-2022	2022-2034	2034-2054
Southland District	Baseline	11,700	12,953	14,185	14,389	0.9%	0.8%	0.1%
	Tiwai closes	11,700	12,953	14,185	14,390	0.9%	0.8%	0.1%
	SGH	11,700	12,953	14,185	14,389	0.9%	0.8%	0.1%
	Aquaculture	11,700	12,953	14,185	14,389	0.9%	0.8%	0.1%
Gore District	Baseline	5,117	5,480	5,718	5,687	0.6%	0.4%	0.0%
	Tiwai closes	5,117	5,480	5,719	5,690	0.6%	0.4%	0.0%
	SGH	5,117	5,480	5,718	5,687	0.6%	0.4%	0.0%
	Aquaculture	5,117	5,480	5,718	5,687	0.6%	0.4%	0.0%
Invercargill City	Baseline	21,695	23,256	26,087	30,034	0.6%	1.0%	0.7%
	Tiwai closes	21,695	23,256	25,678	29,533	0.6%	0.8%	0.7%
	SGH	21,695	23,256	26,146	30,140	0.6%	1.0%	0.7%
	Aquaculture	21,695	23,256	27,025	32,148	0.6%	1.3%	0.9%
Southland Region	<b>Baseline</b>	<b>38,512</b>	<b>41,689</b>	<b>45,990</b>	<b>50,110</b>	<b>0.7%</b>	<b>0.8%</b>	<b>0.4%</b>
	<b>Tiwai closes</b>	<b>38,512</b>	<b>41,689</b>	<b>45,582</b>	<b>49,613</b>	<b>0.7%</b>	<b>0.7%</b>	<b>0.4%</b>
	<b>SGH</b>	<b>38,512</b>	<b>41,689</b>	<b>46,049</b>	<b>50,216</b>	<b>0.7%</b>	<b>0.8%</b>	<b>0.4%</b>
	<b>Aquaculture</b>	<b>38,512</b>	<b>41,689</b>	<b>46,928</b>	<b>52,224</b>	<b>0.7%</b>	<b>1.0%</b>	<b>0.5%</b>

# Appendix 1 – our approach in detail

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This appendix expands on the brief methodology described earlier in *Our approach*, explaining our approach to each facet of the projection, including key assumptions that we have made.

## Employment forecast

Infometrics forecasts regional employment through a combination of three models. Our macro-economic model provides forecasts of national employment on an annual basis up to 2027. Our general equilibrium model forecasts national employment by industry over the long-term. Finally, our regional forecasting model breaks these forecasts down to industries in each region.

### Macro-economic model

Infometrics maintains a macroeconomic forecasting model that underpins our five-year forecasts of activity across the national economy. Our model accounts for the relationships between different sectors of the economy and their responsiveness to one another. These include the labour market, households, businesses, government, the international trade sector, and financial markets.

In times of economic upheaval, we refine the output from the model based on expert input from our forecasting team, their knowledge of rapidly changing trends in the economy, and the insights we gain from our interactions with central government, Councils, Economic Development Agencies, and private sector clients.

Overseeing the forecasting process and model is Gareth Kiernan, who has been forecasting the New Zealand economy for more than 20 years. The framework provides quarterly forecasts of GDP, employment, unemployment, and a range of other macroeconomic indicators up to 2027.

### General equilibrium model

Infometrics general equilibrium (GE) model enables us to produce long term national forecasts of employment by 55 industries. To obtain projections for a 30-year horizon requires an approach that is based on structural issues such as technological change, industry productivity, demographics, evolving demand for different consumer goods and services, and New Zealand's international competitiveness. The model presents a picture or scenario of the economy for the target years (in our case 2030 and 2050) based on plausible assumptions of economic factors including international commodity prices, population growth, carbon price, automation, changes in energy efficiency, and substitution between four energy types (coal, oil, gas and electricity). Some of the key macro-economic assumptions used in the ESSAM model are shown in Table 8.

Long term forecasts should ideally be presented as scenarios given the uncertainty of the future. In this project we will present a central scenario which is based on a central view of a range of factors that can influence employment outcomes over the long term.

Infometrics GE model is maintained by one of New Zealand's foremost econometricians, Dr Adolf Stroombergen.

Table 8. ESSAM macro-economic assumptions and outputs

Indicator	2025-2030	2030-2050
<i>Growth rates</i>		
Population	1.0%pa	1.0% pa
Labour force	0.7%pa	0.46%pa
GDP	2.9%pa	1.7%pa*
World trade	2.7%pa	2.5%pa
Public investment	3.0%pa	2.5%pa
Government consumption	2.1%pa	1.7%pa
Investment in dwellings	2.0%pa	1.0%pa
<i>Real prices</i>		
Oil price	US\$110/bbl in 2030	US\$110/bbl in 2050
Carbon price	NZ\$100/tonne CO <sub>2</sub> in 2030	NZ\$200/tonne CO <sub>2</sub> in 2050

\* These are model results, not input assumptions.

## Regional Forecasting Model

The Regional Forecasting Model (RFM) is an econometric model which breaks national employment forecasts to detailed industry and regional level. It draws on Infometrics 20-year quarterly time series of employment by detailed industry by territorial authority. The model uses a mix of top-down and bottom-up approaches. It simultaneously provides forecasts for all industries in all territorial authorities that are constrained to be consistent with Infometrics macroeconomic forecasts for the national economy in the medium term and the outputs of the GE model in the long term.

A number of sub-models which use a bottom-up approach feed into the Regional Forecasting Model. We build sub-models for industries that we have detailed insights into, and we forecast drivers of employment in those industries. Currently we use four industry sub-models.

### *Construction sub-model*

The construction sub-model provides forecasts of employment in each of the 24 construction sub-industries in each territorial authority. It is an econometric model which is largely driven by Infometrics forecasts of work put in place (WPIP) which are presented to clients via our Regional Construction Outlook product. Our WPIP forecasts are driven by population growth, household formation, and large construction projects which have been signalled. Employment is assumed to respond in a lagged manner to changes in WPIP. The length and magnitude of those lagged responses differs across industries.

### *Education sub-model*

The education sub-model provides forecasts of employment for the following sub-industries: early childhood education, primary education, secondary education, tertiary and vocational education. The model develops a relationship between age cohorts and demand for services from each sub-industry and draws on our age-specific population forecasts to estimate the demand for services from each sub-industry. For example, the



size of the population of 0- to 4-year-olds drives the demand for early childhood education. In some cases, we assume that student to staff ratios will keep falling and these have also been incorporated into our estimates for long-term demand. We then estimate the speed at which employment will converge to long-term demand. The model accounts for trends in international education which are driven by different factors compared to domestic education.

#### *Healthcare sub-model*

The healthcare sub-model disaggregates into healthcare industries (hospitals, dental services, etc) and social service industries (aged care, childcare). We use regional population projections to estimate long-term demand for these services. Where relevant, we combine these regional population projections with estimates of demand for healthcare services by age group. For example, demand for hospital workers incorporates data on the number of hospital bed days by age group.

#### *Retail and hospitality sub-model*

The retail and hospitality sub-model disaggregates into retail industries and hospitality industries (accommodation and food services). Forecasting is a two-stage process. First, we forecast regional retail and hospitality sales, taking into account the different components of sales: local spending, domestic tourism and international tourism. This allows us to account for the regional variations in the impact of COVID, which include lower international tourism but higher amounts of local spending and domestic tourism. Second, we use econometric models to forecast the impact of retail and hospitality sales on employment.

#### *Other industries*

For industries with no sub-model the RFM draws on historic trends, patterns and relationships, and projects these into the future. RFM draws on a 20-year quarterly time series of employment by 500 industries in each territorial authority. It creates multiple forecast models for every territorial authority and industry combination and, using machine learning techniques, selects and applies the model which has proven to have best predictive ability. Using these techniques, it produces forecasts of employment across 500 industries for each territorial authority over the long term.

## Population projection

### Population base

As a rule, the appropriate population to use for Council Long Term Planning (LTP) purposes is the estimated resident population (ERP). This represents all individuals who permanently reside in an area and could be considered a 'maximum' population because a percentage of these individuals are likely to be away at any given point in time.

Consequently, we use the Stats NZ 2022 Estimated Resident Population (ERP) as the basis for the population projections. This estimate is produced by Stats NZ with the most recent available Census (2018) data, and births, deaths and migration that have been recorded since.

Given that the majority of population projection parameters from Stats NZ are published for five-year intervals, our projection model also operates at five-year intervals, from 2018 to 2058. We then make use of a cubic-spline statistical process to interpolate

population to single years. We make adjustments to reflect the fact that with data up to 2021 currently available, we have data for three out of five years in the 2018 to 2023 period. We repeat this process every year to account for Stats NZ's annual publication and revision of subnational population estimates.

## Fertility

Stats NZ projects regional, age-specific fertility rates for five-year age groups, which we apply to our estimates of population by age and gender cohorts, in order to estimate the number of births in each five-year period. Throughout the projection period, we adopt Stats NZ's assumed gender ratio of 105.5 males per 100 females born – this is based on the historic average ratio at a national level. This phenomenon is commonly observed around the world, and is understood to be a function of slightly higher miscarriage rates for female babies, rather than of selective abortion.

## Mortality

Projected age- and gender-specific mortality rates by region or territorial authority, as calculated by Stats NZ, are applied to accurately project the number of deaths. These rates vary over time to reflect observed trends such as extended life expectancy.

## Migration

We build up our projection of net migration in two stages. First, we consider overall volumes of international net migration to New Zealand. This contributes to the total pool of net migrants – international and internal – which we apportion to each territorial authority.

### International net migration volumes

The population projections draw on Infometrics' short- and long-term international migration forecasts (Graph 21).

### Regional distribution of migration

Migration is apportioned to territorial authorities using a mix of two approaches. Firstly, historical migration trends are applied to forecast the volume of non-employment-driven migration, such as people moving at retirement. Secondly, forecast labour market shortfalls are used to forecast the volume of employment-driven migration, such as people moving to take up employment opportunities. Employment-driven migration is also adjusted somewhat to account for commuting patterns between districts.

For non-employment-driven migration, we apply the age and gender profile of Stats NZ's subnational net migration projections. For employment-driven migration, we apply a bespoke age and gender profile, based on Stats NZ's projection with adjustment made around older age groups and groups with net negative migration. Analysis of net migration by age reveals that migration flows of persons aged 80 years and older are relatively unresponsive to economic conditions, as this group is generally not involved in the labour market and migration is driven by non-economic factors such as moving closer to family or healthcare. Therefore, we only model employment-driven migration in age groups up to the age of 79 years. We do model migration of children (0-14 years of age) as being responsive to the employment market as this is evident in historic data, which reflects families moving in pursuit of employment opportunities for the parents.

For areas which receive additional employment-driven migration, we assume that this is concentrated in age-gender groups with positive migration flows, as we expect a strong labour market would accentuate positive regional labour flows and not extend negative flows.

## Labour Market Shortfalls

Labour market shortfalls exist when employers' requirement for labour exceeds the number of workers available at current wage rates. When labour market shortfalls exist in an area, additional labour (and hence population) is attracted to that area.

Infometrics estimates future labour market shortfalls by separately considering the projected supply of labour and the projected demand for labour (as measured by employment) and comparing these two factors.

As the starting point for estimating labour supply, Infometrics makes use of Stats NZ's published population projections by 5-year age group and gender.

Labour force participation rates (LFPRs) by age and gender are projected based on Stats NZ's national labour force projections. In addition, historical LFPRs for each region are analysed to identify their deviation from the national average. This deviation is applied to the national LFPR by age, to project regional LFPR by age. Historical averages for the unemployment rate in each region are analysed and projected forward. Projected LFPR by age is applied to the Stats NZ population projection, and the projected unemployment rate is applied to this, in order to estimate labour supply.

This projection is undertaken for each region or territorial authority, enabling the balance between labour supply and demand (as measured by employment) to be assessed within each area. In periods of insufficient labour supply within a territorial authority or broader regional labour market to meet projected labour demand, the area is projected to receive additional migration.

This additional migration is apportioned to regions or territorial authorities based on their respective share of the national labour market shortfall. At the same time, however, additional migration may be constrained by the Infometrics international net migration forecast, meaning that a particular region may not necessarily receive sufficient inward migration to entirely eliminate its labour market shortfall.

Similarly, the projected LFPR and unemployment rates are applied to the additional migration, reflecting the fact that it is rarely possible to import only workers – instead these workers often come with family members, who may not necessarily be economically active. Examples in this regard might include stay-at-home parents, children and aged dependents. Furthermore, in some instances, migrants may not immediately gain employment following their move.

## Household projection

The number of households at SA2 or district level is projected by applying household formation, or Living Arrangement Type Rates (LATR) to the projected population. Stats NZ projects LATR to 2043 from the 2018 Census figures for each territorial authority. These rates reflect localised differences based on local population composition. For example, some non-European ethnic groups exhibit a greater propensity to form multi-generational households, leading to larger household sizes. These projected rates also consider trends such as delayed childbearing, growing numbers of childless couples,

decreased rates of single parenting, and improvements in life expectancy which enable older individuals to live independently for longer periods. This means that the LATR used in the projections follow a trend up to 2043, and then remain constant at 2043 rates up to 2073.

Applying LATR to the population provides an estimate of the number of people in each living arrangement type; this is then translated into the number of households based on expected family structures – for example, couple households consisting of two individuals. For other multi-person households, we follow the standard Stats NZ assumptions, and assume 2.6 persons per household. Projected population figures are accordingly divided by the number of households to project average household size.

The projected household size calculated in these projections varies somewhat from the 2018 Census measures. This is because Census counts are randomly rounded to the nearest multiple of 3, or suppressed entirely, so as to ensure confidentiality of Census respondents. Census outputs such as average household size are however based on actual data, meaning that it is impossible for third parties to precisely replicate these outputs. Projection outputs can also vary from Census measures due to short-term changes such as increased housing occupancy in response to increasing housing costs.